Northern Contaminants Program

Summary of projects for 2003-2004

Indian and Northern Affairs Canada
Affaires indiennes et du Nord Canada

Canada

106-00534/

Northern Contaminants Program

Summary of Projects for 2003-2004

Foreword

The Northern Contaminants Program (NCP) was established in 1991 in response to studies which showed the presence of contaminants in the Arctic ecosystem. Many of these contaminants had no Arctic sources. The three main contaminant groups of concern are persistent organic pollutants (POPs), heavy metals and radionuclides. Some of these contaminants are found at unexpectedly high levels in animals at the top of the food chain and in humans. The NCP is led by Indian and Northern Affairs Canada and brings together federal departments (Indian and Northern Affairs Canada, Health Canada, Environment Canada, and Fisheries and Oceans Canada), the three territorial government departments (Yukon, Northwest Territories, and Nunavut), northern Aboriginal peoples' organizations (Council of Yukon First Nations, Dene Nation, Inuit Tapiriit Kanatami, and Inuit Circumpolar Conference - Canada) and university researchers. Together they work towards reducing and, wherever possible, eliminating contaminants in traditionally harvested foods and providing information that assists informed decision-making by individuals and communities in their food use.

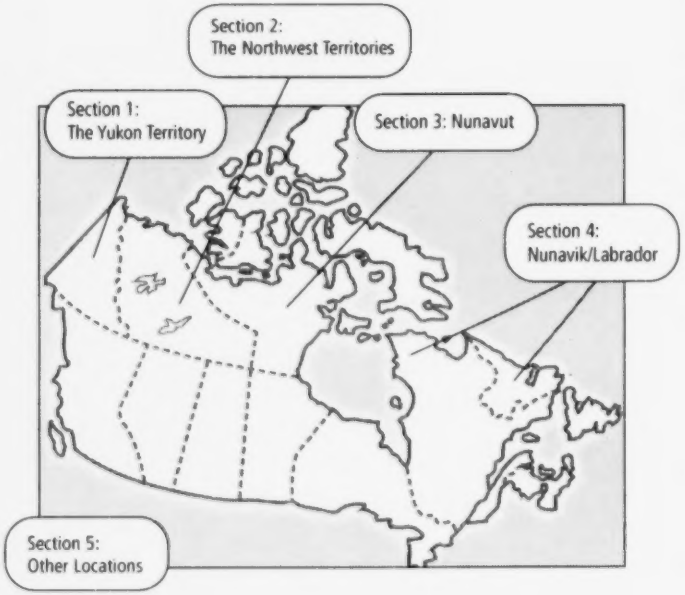
Between 1991-1996, NCP research was focussed on assessing where contaminants were found in the Arctic, at what levels, and confirming the source region. From 1998-2003, under Phase II, the NCP shifted towards a greater emphasis on human health research, developing effective community dialogue, increasing community participation, and working towards international agreements to control the release of contaminants. Under the next phase of the NCP, the focus will be on protecting Aboriginal health and safety as a result of exposure to contaminants from consuming traditional/country foods.

The NCP funds research on northern contaminants issues in addition to supporting the participation of Aboriginal peoples' organizations. A portion of its funds is directed to communicating the research results to northern communities. The education and communications part of the program is led by the representatives of the northern Aboriginal peoples' organizations.

People and organizations seeking funding for projects related to northern contaminants issues submit proposals to the NCP each year. A management committee consisting of representatives from government and northern Aboriginal peoples' organizations meet to evaluate the proposals and approve funding for projects which meet the goals of the program. Anyone conducting research in the North is required to consult with the communities that will be involved in the research and complete consent forms. Project leaders are required to present their results at an annual NCP workshop, and to submit a brief description of their research results at the end of the year. Every year since 1991 these results have been published as the "Synopsis of Research Conducted Under the Northern Contaminants Program". These documents are available through the NCP. More information about the program can be found on the NCP website:
http://www.ainc-inac.gc.ca/ncp/

This booklet, the "Northern Contaminants Program Summary of Projects for 2003-2004" provides a quick, non-scientific reference guide for communities and other interested groups on current-year projects being conducted by the NCP.

How to use this booklet



To help you find the information in this booklet that is of interest to you:

- The booklet is divided into five sections based on the geographical location of where projects are or will be mainly occurring (The Yukon Territory, The Northwest Territories, Nunavut, Nunavik/Labrador and Other Locations).
- Each project summary contains the question the project is answering, relevance (why the project is occurring), summary, and location.
- There are "icons" (please see following page) located throughout the pages of the booklet to help communicate what the project is about, how you can get more information about the project, and where and when the project is occurring.
- The **bold** words within the text of the booklet are defined in the Glossary of Terms in Appendix A at the end of the booklet.
- If you wish to search for a project by affiliation or project leader, or by key subject areas and contaminant please refer to Appendix B (Affiliations and Project Leaders) and Appendix C (Key Subject Areas and Contaminants) at the end of the booklet.
- If you have more questions about any of these projects, contaminants in the North or contaminants in general, there is a list of people whom you can contact for this information in Appendix D (For More Information) at the end of the booklet.

Explanation of icons used in this booklet

PROJECT CATEGORY

Human Health project

Monitoring project

Communications project

International Policy project

WHAT THE PROJECT IS STUDYING:

Persistent Organic Pollutants (POPs)

Heavy Metal Contaminants

Radionuclide Contaminants

HG Mercury

TK Traditional Knowledge

Traditional Food

Education

Administration

QA/QC Quality Assurance/ Quality Control

Seals

Walrus

Whales

Fish

Seaducks

Seabirds

Arctic Foxes

Polar bears

Caribou

Dall's Sheep

Marine Mammals

Moose

Mink

Wolverines

People

Children

Snow

Ice

Rain

Water

Ocean

Air

Sediments

OTHER DETAILS:

The project involves fieldwork

The project involves work taking place in a laboratory

The project involves computer models and database work

The project involves a workshop and/or a meeting

Contact information

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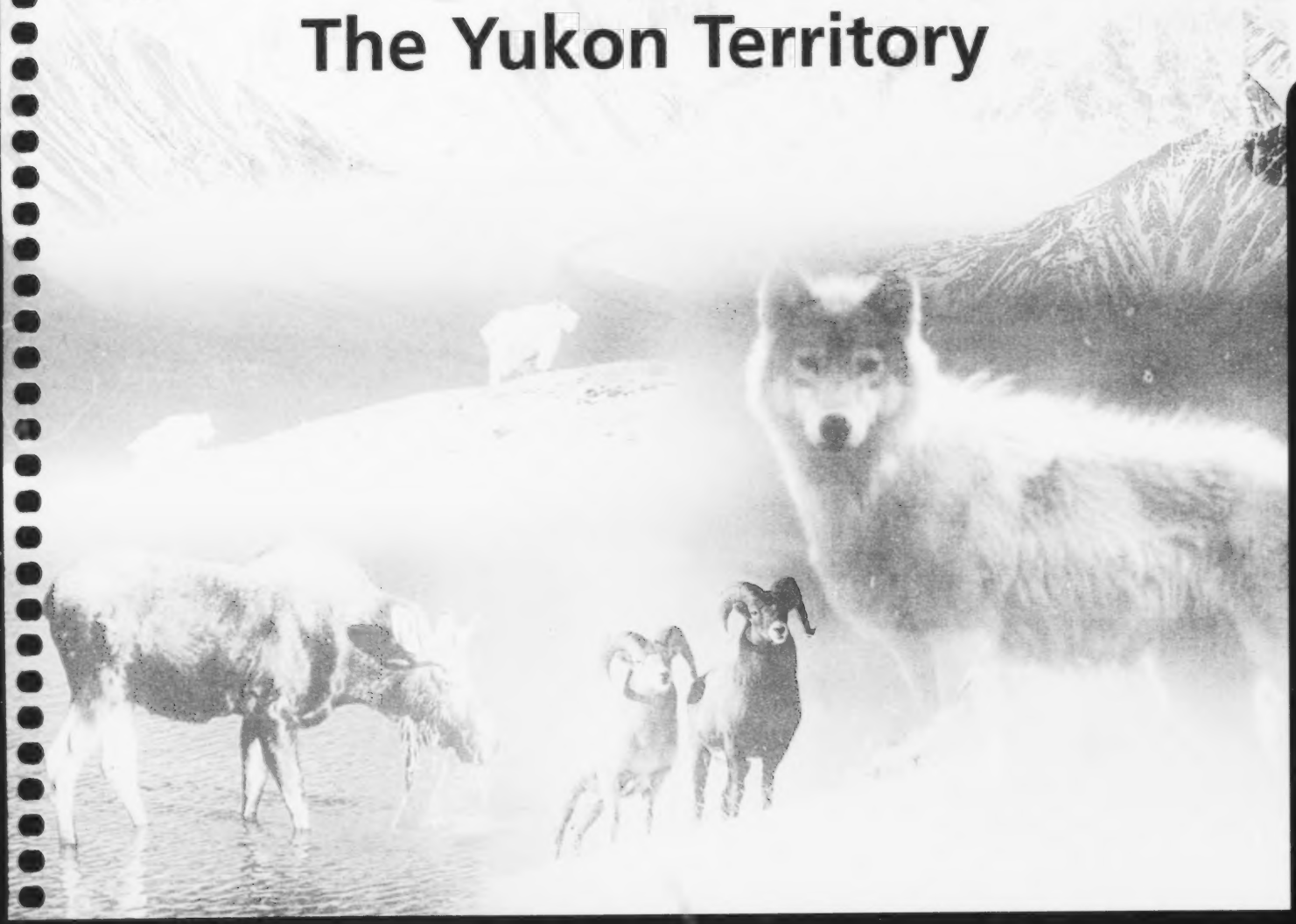


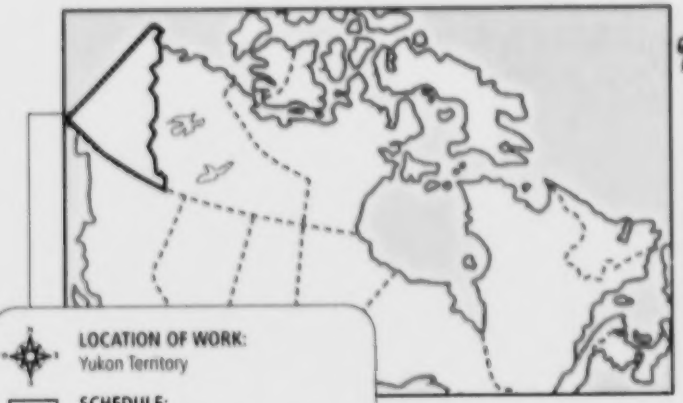
The Yukon Territory

Northern Contaminants Program Survey in the Yukon

? *What do people in Yukon know about contaminants in the North?*

RELEVANCE:
The **Northern Contaminants Program (NCP)** has provided the people of the Yukon with a better understanding of the presence, distribution and effect of harmful **contaminants** over the last ten years. In order to better understand what people are hearing and retaining through our efforts to communicate, we need to do an in-depth survey of Yukon communities. We need to know if the messages are getting out, and that the training and workshops that we have conducted over the years have been beneficial. It is important that we have a clear understanding of what the communities are saying and what they know about the NCP in order to move forward with contaminants communication.

PROJECT SUMMARY:
This project will develop a set of non-leading questionnaires that will be administered locally in each community. The questionnaires will be composed of general questions about the NCP, long-range contaminants, and traditional/country foods. It will be short and the subject will be able to enter his/her name for a draw for a prize. The results will be communicated to the public through the Yukon Contaminants Committee and Council of Yukon First Nations (CYFN).



LOCATION OF WORK:
Yukon Territory

SCHEDULE:
For more information, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Cindy Dickson
Northern Contaminants Program
Council of Yukon First Nations
11 Nisutlin Dr
Whitehorse, YT
Y1A 3S4

Phone: (867) 393-9214
Fax: (867) 668-6577
E-mail: cdickson@cyfn.net

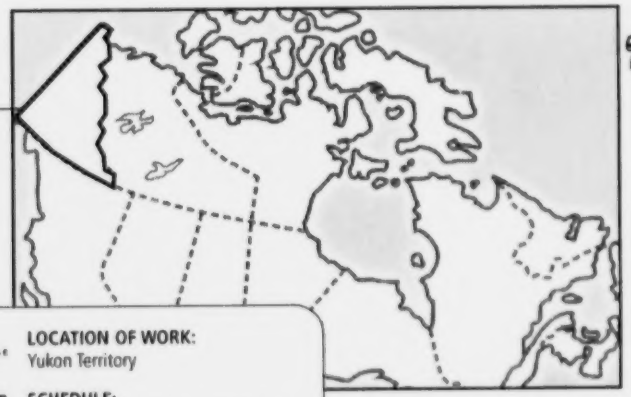
TIME FRAME:
Project results will be communicated to the public through the Yukon Contaminants Committee and CYFN. A report will be prepared for the NCP Synopsis of Research Report.

Yukon Contaminants Committee Communication Program

How can communities in the Yukon find out more about contaminants research and have opportunities to get involved in the Northern Contaminants Program?

RELEVANCE:
The Yukon Contaminants Committee (YCC) was formed in 1991. It co-ordinates the communication of **contaminant** information and research initiatives in the Territory. The committee contains a diverse membership and is represented by several federal and territorial departments, as well as the Council of Yukon First Nations, Yukon Conservation Society and Yukon College. Since its establishment, the YCC has acted as a link between the scientific community and northerners on local, national and international contaminants issues and has tried to answer the questions Yukoners have regarding contaminants in the North.

PROJECT SUMMARY:
The project will continue to communicate the results of the work carried out under the **Northern Contaminants Program (NCP)**, educating northerners on contaminant issues. It will also assist southern researchers in establishing contact with northern researchers to provide links to regional, national, and international contaminant programs. The project will also continue to review proposals for socio-cultural content and provide subjective reviews for Yukon-based communication initiatives. The committee members will attend annual management committee meetings and workshops as required.



LOCATION OF WORK:
Yukon Territory

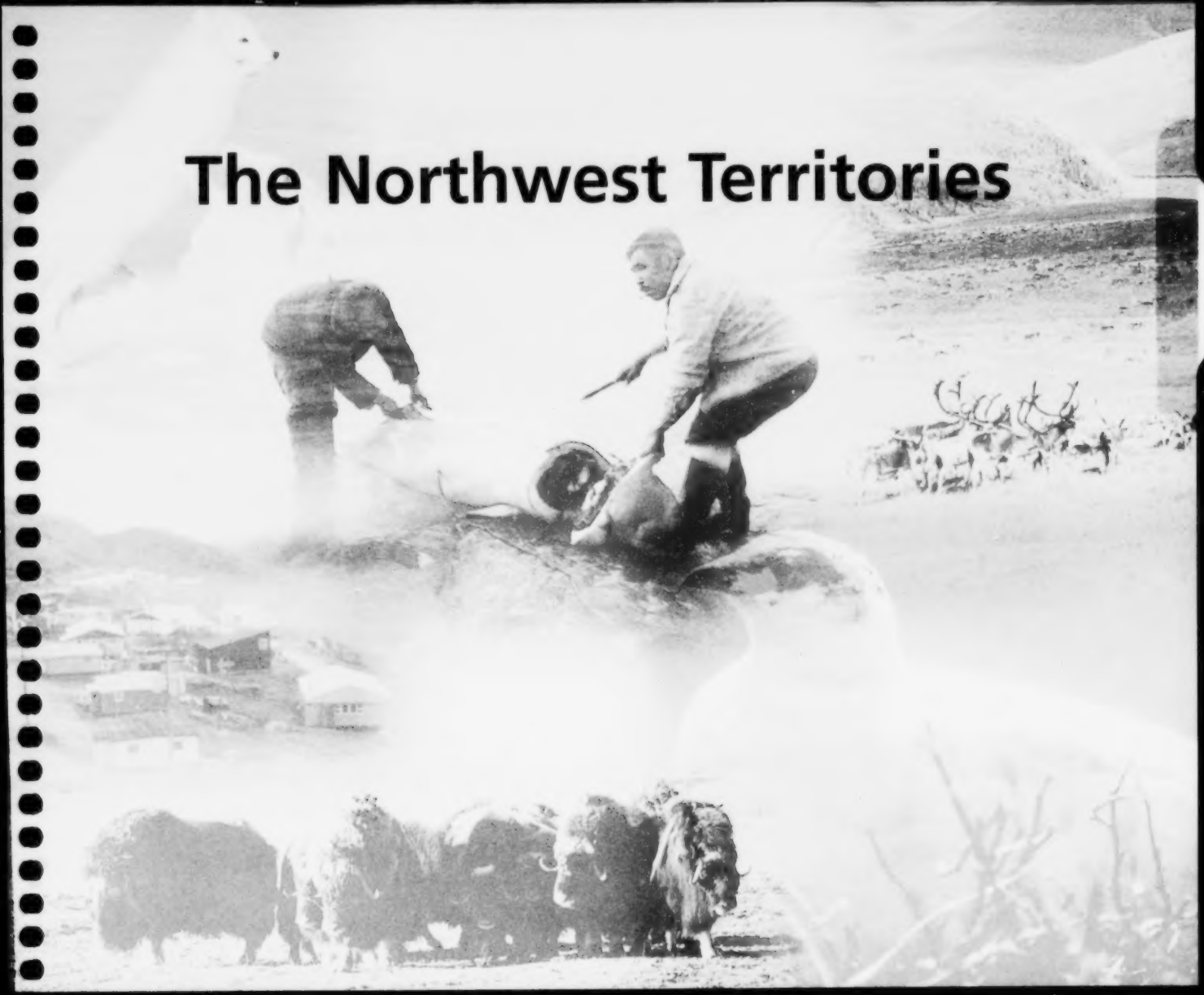
SCHEDULE:
For more information, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Pat Roach
Chair, Yukon Contaminants Committee
Indian and Northern Affairs
Yukon Region
300-300 Main Street
Whitehorse, Yukon
Y1A 2B5

Phone: (867) 667-3283
Fax: (867) 667-3271
E-mail: RoachP@inac.gc.ca

TIME FRAME:
April 2003 - March 2004.

The Northwest Territories



N.W.T.

The Northwest Territories

Gwich'in Contaminants Communication

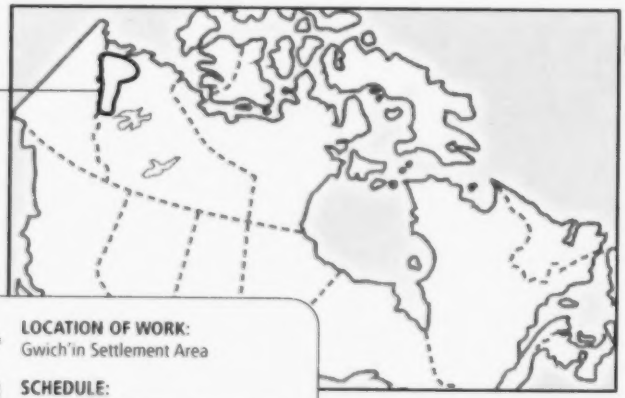
How can relevant CACAR II results be communicated to Gwich'in?

RELEVANCE:

This project will promote better dialogue between the communities, Gwich'in organizations, **Northern Contaminants Program (NCP)** representatives and NCP scientists. The project will assist in providing essential information to Gwich'in communities. This will strengthen the knowledge of Gwich'in community members which will allow them to make more informed decisions regarding the harvesting and use of traditional/country foods.

PROJECT SUMMARY:

The project looks to promote accessible and accurate **contaminants** information to a broad spectrum of community members in the Gwich'in Settlement Area. The information handed out will help assess local information requirements for traditional/country foods and the health and safety of the communities. Regionally relevant resource material will be developed. The project's main goal will be to communicate the results of **Canadian Arctic Contaminants Assessment Report II (CACAR II)** to the communities through various means. The project will also assist communities in identifying and submitting proposals to access NCP and other program funding.



LOCATION OF WORK:
Gwich'in Settlement Area

SCHEDULE:
For more information, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Gwich'in Tribal Council
Box 1509
Inuvik, Northwest Territories
X0E 0T0

Phone: (867) 777-7900
Fax: (867) 777-7919

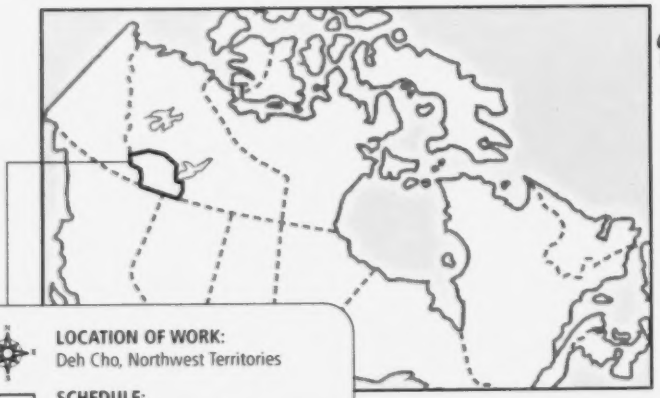
TIME FRAME:
A mid-year and a final year end report will be written.

Communicating CACAR II and Nunavik Cohort Study Results in the Deh Cho Region

? *How can relevant CACAR II results be communicated in the Deh Cho Region?*

RELEVANCE:
There is a need to communicate environmental **contaminants** information in the Deh Cho region. In the past, newspaper articles did not necessarily portray accurate information on traditional/country foods. Throughout the last five years, there have been several projects and studies that bear relevance to people of the Deh Cho, and the results of these studies need to be communicated. In light of recent studies, it is important that a proactive approach be taken to ensure that Deh Cho communities are aware of the results, and more importantly, that they are aware traditional/country food is safe to eat.

PROJECT SUMMARY:
This project proposes to hire and train a Deh Cho First Nations member as a community liaison. There will also be community tours that will bring information to the communities and obtain feedback on research priorities in the Deh Cho. Presentations will be delivered at community meetings, leadership meetings, and annual assemblies, schools and pre-natal programs. The results from **Canadian Arctic Contaminants Assessment Report II (CACAR II)** will also be summarized and the results of recent studies will be communicated to make sure that the communities understand that traditional/country food is still safe to eat.



LOCATION OF WORK:
Deh Cho, Northwest Territories

SCHEDULE:
For more information, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Kelly Pennycook
Resource Management Coordinator
Deh Cho First Nations
Box 89
Fort Simpson, NT
X0E 0N0

Phone: (867) 695-2355
Fax: (867) 695-2038
E-mail: kelly_30@hotmail.com

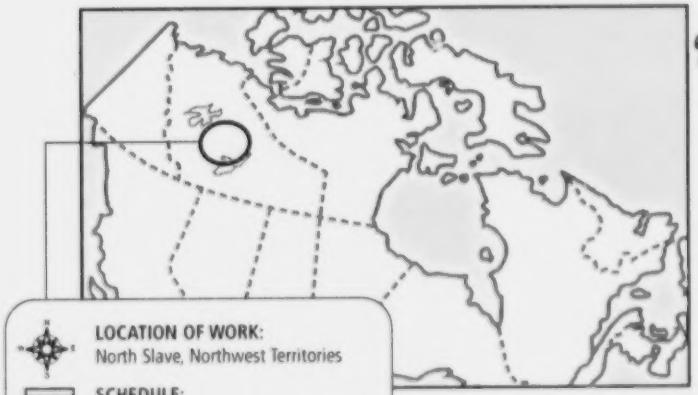
TIME FRAME:
April 2003 – March 2004. An interim and a final report will be written.

Contaminants Communication in the North Slave Métis Region

How can CACAR II be broken down into a comprehensible format and communicated to North Slave Métis?

RELEVANCE:
In light of the **Canadian Arctic Contaminants Assessment Report II (CACAR II)** being released, the North Slave Métis Alliance (NSMA) requires the capacity to communicate with the NSMA Board and communities regarding **contaminants** and the work carried out by the Northwest Territories Environmental Contaminants Committee (NWTECC) and the **Northern Contaminants Program (NCP)**. The information will allow the NSMA Board and the Métis community to make informed decisions in regards to the harvesting and consumption of traditional/country food.

PROJECT SUMMARY:
The project looks to assess and summarize the information in the CACAR II report and repackage it into a format easily understood by the NSMA Board, members, and Métis in the region. This will require that information sessions be coordinated and facilitated for NSMA members who live in Yellowknife and Rae. These two information sessions will seek to communicate and gather information from members about the CACAR II report. In turn this will help the Board assist Métis people in accessing the contaminant information available so that they may make healthy food choices. NSMA will also attend NWTECC meetings as a representative of Métis people in the region.



LOCATION OF WORK:
North Slave, Northwest Territories

SCHEDULE:
For more information, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Kris Johnson
Lands & Resource Coordinator
North Slave Métis Alliance
P.O. Box 340
Yellowknife, Northwest Territories
X1A 2N3

Phone: (867) 873-9176
Fax: (867) 669-7442
E-mail: kris@nsma.net

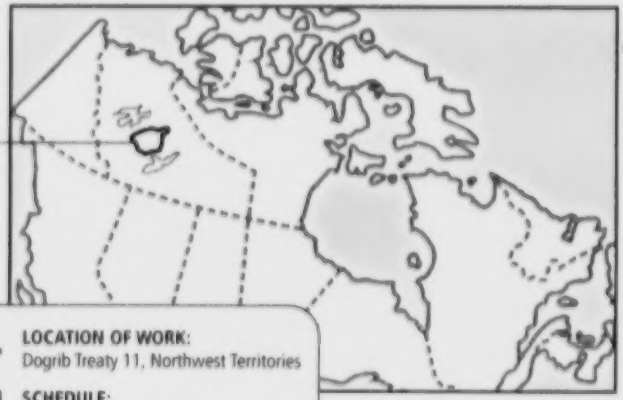
TIME FRAME:
April 2003 – March 2004.

Radio Communication for the Dogrib Nation Communities

? *What is the relevant information in CACAR II for the Dogrib Nation people?*

RELEVANCE:
Within the Northwest Territories, the Environmental Contaminants Committee (NWTECC) oversees **Northern Contaminants Program (NCP)**-funded activities. Education and communication will be the priority of the NWTECC with respect to the four Dogrib Nation Communities: Rae-Edzo, Whati', Gameti', and Wekweti'. Within the communities little is known about the **Canadian Arctic Contaminants Assessment Report II (CACAR II)** and what sections of the report are relevant to the Dogrib Nation people. The elder and younger generations need to understand the issues surrounding northern **contaminants**.

PROJECT SUMMARY:
The project will communicate information on issues related to contaminants in the North. This will include local contaminants information, **persistent organic pollutants (POPs)** effects information, educating school children, and informing the public about the effects of contaminants in terrestrial and aquatic **ecosystems**. The information provided to the communities will assist them in making informed decisions regarding the harvesting and consumption of traditional/country food. The information will be communicated through a radio talk show presented by the Canadian Broadcast Corporation (CBC) in the Dogrib language. The show will air on a bi-weekly basis and any questions or comments will be addressed.



LOCATION OF WORK:
Dogrib Treaty 11, Northwest Territories

SCHEDULE:
For more information, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Lloyd Woloshyn
Dogrib Rae Band
P.O. Box 2451
Yellowknife, Northwest Territories
X1A 2R3

Phone: (867) 920-7288
Fax: (867) 920-7328
E-mail: glafferty@yk.com

TIME FRAME:
April 2003 - March 2004

NWT Environmental Contaminants Committee (NWTECC)

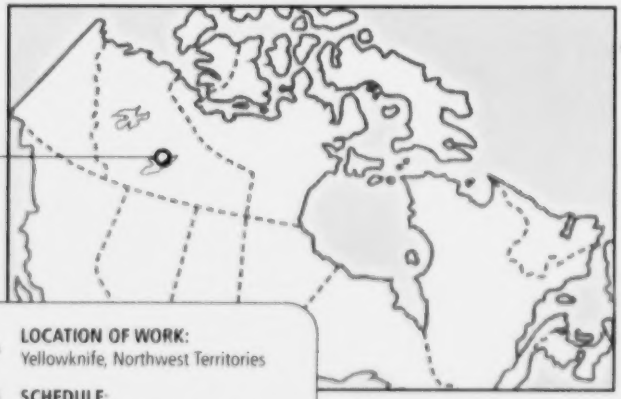
? *How can people in the NWT find out more about current contaminants research?*

RELEVANCE:

The Northwest Territories Environmental Contaminants Committee (NWTECC) has been the main communicator in the territory for the **Northern Contaminants Program (NCP)** since 1998. The committee members consist of various departments in the federal and territorial governments and national and regional Aboriginal partners. The coordination of **contaminants** information and research initiatives in the territory is overseen by the committee. The NWTECC also offers an opportunity for researchers and communities to provide input into contaminant activities and express their concerns. The Indian and Northern Affairs Canada (INAC) Yellowknife office provides secretariat support to the NWTECC.

PROJECT SUMMARY:

The NWTECC will facilitate the process of collaborative study, assessment and communication of information to residents of NWT about the presence and possible effects of contaminants in the environment. A forum for two-way transfer of contaminants information relevant to the NWT will be provided by the NWTECC during monthly meetings. There will also be effort made to improve the communications network that ensures northerners are informed and involved in contaminants activities. This will involve identifying priorities and information gaps related to environmental contaminant research in the NWT. Being the main communicator for the NCP in the territory, the NWTECC will act as a central repository of environmental contaminant information and provide advice on appropriate funding sources for NWT. The committee will also review NCP NWT proposals prior to full technical reviews.



LOCATION OF WORK:
Yellowknife, Northwest Territories

SCHEDULE:
For more information, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Marc Lange
Chair, NWT Environmental Contaminants Committee
Department of Indian and Northern Affairs
Box 1500
Yellowknife, Northwest Territories
X1A 2R3

Phone: (867) 699-2665
Fax: (867) 669-2833
E-mail: LangeM@inac-ainc.gc.ca

TIME FRAME:
April 2003 – March 2004. A mid-year and year-end report of activities will be delivered, as well as reports and minutes from meetings.

HG

Mercury Levels in Fish in Traditionally Harvested Lakes

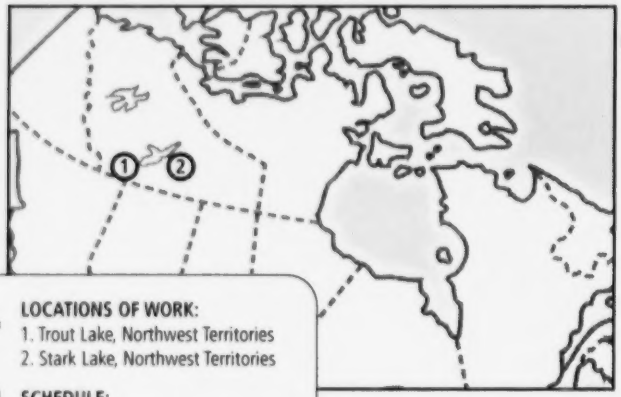
? *What are the levels of mercury in fish and how are levels changing over time?*

RELEVANCE:

Many lakes in the Mackenzie River Basin have been studied for **mercury contaminants**. Some of these lakes contain fish with high mercury levels while fish from other lakes have lower levels of mercury. It is important to monitor the levels of mercury in fish from these lakes to provide up-to-date information for people harvesting the fish. Monitoring data can also be used to determine how levels of mercury are changing over time. It may never be possible to analyze fish samples from every lake; therefore it is important to investigate factors that influence mercury levels. There appears to be a connection between the level of mercury found in the fish and the size of the lake and the degree to which it is fished. There is some evidence that small lakes and lakes that are rarely fished tend to have fish that contain higher levels of mercury; however, this correlation has not yet been well established. People who fish in certain lakes have also noted that the fish are 'skinny' and wonder if it is due to mercury contaminants.

PROJECT SUMMARY:

This project will investigate mercury levels in fish from two lakes in the Northwest Territories: Trout Lake and Stark Lake. Mercury levels in trout, pike, walleye, and whitefish will be determined and compared to data collected in a 1990/1991 study to investigate changes in levels over time. The species of fish that have been chosen for this project are all 'piscivorus', i.e. fish that eat other fish, because this type of fish contains higher mercury levels compared to other species due to **biomagnification**. All the fish collected will be measured in length, weighed, and their aged determined. The environmental factors affecting the fish, such as feeding habits and lake characteristics, and potential associations between these and fish mercury concentrations will also be examined. The association between high levels of mercury and length, weight, age and feeding relationships for each fish species will be determined. Some of the trout collected will also be analyzed for other **heavy metals**. To help interpret the project data, water quality and plankton will also be studied.



LOCATIONS OF WORK:
1. Trout Lake, Northwest Territories
2. Stark Lake, Northwest Territories

SCHEDULE:
For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Marlene Evans
National Water Research Institute
Environment Canada
11 Innovation Boulevard
Saskatoon, Saskatchewan
S7N 3H5

Phone: (306) 975-5310
Fax: (306) 975-5143
E-mail: marlene.evans@ec.gc.ca

TIME FRAME:
April 2004 - a report will be submitted to Trout Lake, Lutsel K'e and the **Northern Contaminants Program (NCP)**.

Nunavut

Photo credit: L Baizana

Nunavut

Monitoring Temporal Trends of Contaminants in Maternal Blood and Hair Samples in Nunavut and the NWT

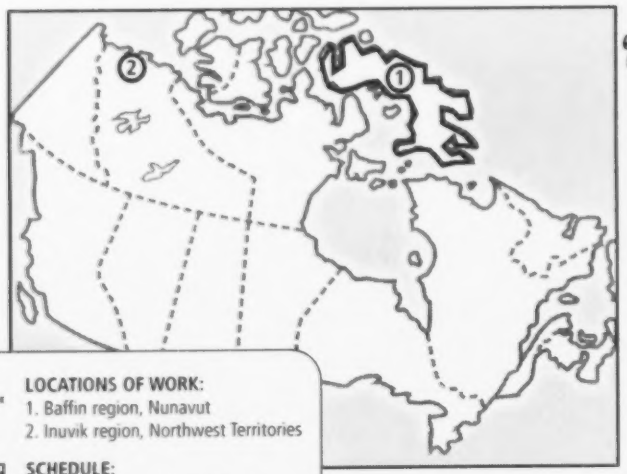
? *What are the contaminant levels in humans in the NWT and Nunavut, and are these levels changing over time?*

RELEVANCE:

Between 1994 and 1999 a baseline for selected **organochlorine** and metal contaminants was established for maternal and cord blood in the Northwest Territories and Nunavut. As it has been several years since the collection of the baseline data, it is now an appropriate time to resample in an attempt to establish a **temporal trend** of contaminant levels in humans. Higher levels of prenatal exposure to certain contaminants have recently been found to be associated with subtle **neurodevelopmental** and **immunological** effects in Inuit infants from Nunavik. In light of this recent research, it would be valuable to reassess the levels of contaminants in mothers who are from northern communities representing a range of exposures. The intent of the project is to strategically focus sampling in two regions and determine the temporal trends in those regions. The study will also contribute data to international contaminant monitoring initiatives such as the Global Monitoring Plan under the **Stockholm Convention**.

PROJECT SUMMARY:

The project will assess temporal trends of maternal exposure to selected organochlorine and metal contaminants in the Northwest Territories and Nunavut. Two regions will be chosen based on the levels of contaminants found in each region. Initial suggestions include working with women from the Baffin and Inuvik health regions, which represent the highest and lowest exposures among Inuit, respectively. The latter region also includes some women from Dene and Métis communities characterized by lower exposure levels. Work in 2003/2004 will focus on the feasibility of the project, and will involve planning research methods and consulting with the communities as to where the research should be undertaken. The work will include establishing communication networks, developing a questionnaire for participants, and developing tools for recruitment and sample protocols. Assuming the results of the feasibility study are positive, future work will likely include collecting samples over a 12-month period. The data collected will be analyzed for changes in levels compared to the earlier maternal blood survey, and to find a relationship between contaminant levels in the blood, and traditional/country food intakes and lifestyle factors.



LOCATIONS OF WORK:
1. Baffin region, Nunavut
2. Inuvik region, Northwest Territories

SCHEDULE:
Travel to communities will begin late 2003-early 2004. For more information, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Erica Myles
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T2P 1H7

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Fax: (403) 269-5245
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TIME FRAME:
In 2003/2004, work will focus on consultation with the proper organizations, establishing roles, developing sampling protocols and a lifestyle/ dietary survey, and developing an introductory project description package.

HG TK

Managing the Issue of Mercury Exposure in Nunavut

What is the best way to maximize the benefits of traditional/country food use, while minimizing the risks from mercury exposure?

RELEVANCE:
Studies have shown that Inuit living in Nunavut are exposed to **mercury** through the consumption of traditional/country food. The main dietary contributors of mercury are ringed seal, caribou, lake trout, Arctic char, and beluga and narwhal muktuk. The consumption of relatively small amounts of marine mammals can contribute significant amounts of dietary mercury. There is a growing concern about the health effects that may arise as a result of this exposure. However traditional/country foods are also known to contain many beneficial nutrients that are thought to counter the **toxic** effects of mercury. **Neurobehavioural** studies show that mercury may be one of the **contaminants** associated with subtle changes in exposed Inuit populations, especially infants. There is a need to manage better the issue of mercury exposure among the more highly exposed populations.

PROJECT SUMMARY:
This project will examine changes in health and quality of life of Nunavut Inuit in two communities to determine the effects of dietary contaminants and lifestyle. It will attempt to identify which traditional/country food items are the main sources of mercury. The research will begin by developing a methodology and research partnership that is culturally acceptable to the communities. Once a methodology is chosen, sampling will commence. Two local assistants will be trained and hired to visit the homes of approximately 50 participants, and to conduct a 30-minute interview about their dietary practices. The assistants will also sample hair and toenails from each participant. Individuals from the community having lower levels of mercury will be used as a control group. The test results will be reported to each participant and the potential health implications will be discussed.

HG TK

LOCATIONS OF WORK:
1. Nunavut
2. Montreal, Québec

SCHEDULE:
For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Laurie Chan
Centre for Indigenous Peoples' Nutrition and Environment (CINE)
McGill University 21,111 Lakeshore Road
Ste-Anne-de-Bellevue, Québec
H9X 3V9

Phone: (514) 398-7765
Fax: (514) 398-1020
E-mail: Laurie.Chan@McGill.ca

TIME FRAME:
The project will take place primarily in early winter 2004. Results of the mercury levels and health implications will be communicated to the study participants by the researchers within six months of completing the sampling. A progress report and a final report will be prepared.

HG

Determinants of Child Health and Development as Related to Contaminants: Feasibility of Expanding the Nunavik Cohort Study to the Baffin Region

? *What are the determinants of a child health and development as related to contaminants?*

RELEVANCE:

Persistent organic pollutants (POPs) and **mercury** reaching northern regions by **long-range transport** are known to **biomagnify** through aquatic **food chains** to reach relatively high levels in top predator species such as polar bears, beluga whales and seals. Inuit rely heavily on marine foods for their subsistence, particularly the fat of ringed seal and beluga. During **Northern Contaminants Program (NCP)**-I and NCP-II, a longitudinal cohort study was carried out which investigated the factors affecting child health and development in Nunavik. Prenatal exposure to POPs has been linked to subtle effects in **neurobehavioural** development during infancy. It would be valuable to expand the project to the Baffin region, in order to assess whether similar effects are being experienced by infants outside Nunavik. The Baffin population is characterized by similar contaminant exposure levels as those found in the Nunavik population; the Baffin exposures are the highest in Nunavut.

PROJECT SUMMARY:

The project will focus on establishing whether it is feasible to expand the Nunavik cohort study to Baffin. This will involve working closely with the appropriate health authorities and key people in the Baffin region and in Health Canada. The information obtained during this feasibility study will help clarify issues such as which interests, authorities and professionals should be involved; research procedures for recruiting participants; protocols for collecting data (e.g. maternal interviews, taking samples, and testing the infants) and what facilities would be required for conducting such research.

HG

LOCATIONS OF WORK:
1. Baffin region, Nunavut
2. Ste-Foy, Québec

SCHEDULE:
For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Gina Muckle
Public Health Research Unit
Laval University Medical Research Centre
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Ste-Foy, Québec
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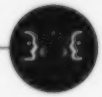
TIME FRAME:
April 2003 - March 2004



Nunavut 1% Population Survey

Have the communication efforts over the last five years been effective in Nunavut?

RELEVANCE:

Over 5 million dollars was spent on communicating information to northerners over the last five years of the **Northern Contaminants Program (NCP)**. However, there has been little formal effort to verify if the communications effort has been successful. This project will identify current general knowledge and perceptions, as well as misunderstandings on **contaminants** and health issues within the communities of Nunavut.

PROJECT SUMMARY:

The project will create a 20-30 question survey which will cover topics including environmental contaminants, human health effects, and communication. A trained community member will administer the survey to approximately 1% of the population, selected at random. The information from the survey will be used to create the "five-year Nunavut communication strategy."

LOCATION OF WORK:
Nunavut

SCHEDULE:
For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Glen Stephens
Indian and Northern Affairs Canada
969 Qimugjuk Building, 2nd floor
P.O. Box 2000
Iqaluit, Nunavut
X0A 0H0

Phone: (867) 975-4549
Fax: (867) 975-4585
E-mail: StephensG@inac-ainc.gc.ca

TIME FRAME:
2003/2004

July-September: Work with Inuit regions to prepare a Inuit-wide standard questionnaire and verify comprehension of questionnaire with a small sample of Iqaluit residents. Verification of translation.

September-December: Prepare for full survey application.

December-March: Administer questionnaire.

Niqiit Avatittinni Committee

How can people in Nunavut be informed about contaminants research and become more involved in the NCP?

RELEVANCE:
Communities in Nunavut are involved with many research and communication efforts under the **Northern Contaminants Program (NCP)**. The Niqiit Avatittinni Committee (NAC) serves to address interests and concerns of Inuit in Nunavut about health and the environment. It provides residents with an avenue for meaningful input into NCP research and communication activities, a means to develop partnerships with researchers, and a forum to express concerns. The health risks associated with a marine mammal-based traditional/country food diet and the geographically dispersed and isolated Inuit communities are important factors that support this approach to dealing with **contaminant** issues in Nunavut.

The Niqiit Avatittinni Committee evolved from the Nunavut Environmental Contaminants Committee (NECC) in response to changing objectives. Committee members include professionals working in the fields of health and nutrition, environmental impact assessment and research. All the proposals relating to Nunavut and the Nunavut-based communication initiatives will be reviewed by the committee for socio-cultural content. The committee will continue to develop a communications network to insure people are informed and involved in contaminants and health-related activities. The information gathered by the committee on the presence and possible health effects of contaminants in the environment will be provided to **Nunavummiut**.

PROJECT SUMMARY:
The Niqiit Avatittinni Committee will facilitate the process of collaborative study, assessment and communication of information to Nunavummiut about the presence and possible health effects of contaminants in the environment. The goals of the committee are to: direct research in the area of contaminants and the effects on human health; review proposals; provide a focus on environmental contaminants in relation to human health and nutrition, especially traditional/ country foods; compile public concerns that have not been addressed and provide direction to researchers and decision makers to direct these activities; communicate results of the research to the public; help researchers translate their data into information meaningful to the public; and provide expertise on issues related to environmental contaminants.

LOCATIONS OF WORK:
Nunavut

SCHEDULE:
For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:

Project Leader: Glen Stephens
Chair, Nunavut Contaminants Committee
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Qimugjuk Bldg.
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X0A 0H0

Phone: (867) 975-4549
Fax: (867) 975-4585
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Amy Caughey
Department of Health and Social Services
P.O. Box 1000, Station 1000
Iqaluit, Nunavut
Z0A 0H0

Phone: (867) 975-5729
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TIME FRAME:
A year end report of activities will be delivered in March 2004.

HG

Temporal Trends of Mercury in Landlocked Arctic Char

? *How are levels of mercury in landlocked Arctic char changing over time?*

RELEVANCE:

"**Temporal trends** of **contaminants** as influenced by climate change" and "How is **mercury** entering **ecosystems**, as applied to communities with high observed mercury levels" are two areas that the **Northern Contaminants Program (NCP)** has identified as subjects of interest for the 2003/2004 year. Freshwater fish are good indicators of contaminants that accumulate in lakes from meltwater runoff and direct precipitation. Recent studies have proposed that climate warming and destruction of the ozone layer might be enhancing mercury deposition thereby contributing to increased mercury levels in northern environments. This project, which has been running since 1999, investigates these issues by annually measuring the concentration of pollutants in Arctic char to determine if mercury concentrations are changing over time.

PROJECT SUMMARY:

This project seeks to determine the temporal trends of mercury and other metals in Arctic char found in northern Arctic lakes through annual sample collections from lakes that have been previously investigated. The lakes being researched during 2003-2004 are Resolute, Amituk, and Hazen lakes. Arctic char will be collected from Resolute and Amituk lakes. Sediment cores and lake water will be collected from Hazen Lake. The project will also investigate what other factors – such as water temperature, sampling period and diet – influence the level of contaminants found in landlocked Arctic char. The project will also look at levels of new and old **persistent organic pollutants (POPs)** in the fish from the lakes important to the community of Qausuittuq. The results of this project will help determine if the levels of contaminants are changing over time in Arctic char.

HG

LOCATIONS OF WORK:
1. Resolute Lake, Nunavut
2. Amituk Lake, Nunavut
3. Hazen Lake, Nunavut

SCHEDULE:
For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Derek Muir
National Water Research Institute
Environment Canada
Burlington, Ontario
L7R 4A6

Phone: (905) 319-6921
Fax: (905) 336-6430
E-mail: derek.muir@ec.gc.ca

TIME FRAME:
Samples will be collected in early August 2003. Preliminary results will be available in early January 2004. A final report will be prepared in March 2004.

Contaminants in Arctic Seabird Eggs

How are contaminant levels in Arctic seabirds changing over time?

RELEVANCE:
Since 1975 eggs from Arctic seabirds have been collected at Prince Leopold Island. Eggs were chosen because they can provide needed information on the state of the surrounding environment without harming adult birds. Another reason for measuring **contaminants** in seabirds and their eggs is to provide information to northerners who harvest them for consumption. For the most part the data shows a declining trend in **dioxins**, **furans** and **organochlorines**, such as **PCBs**, and **DDT**. There is, however, an increase in **polybrominated diphenyl ethers (PBDEs)** and **mercury**. This project proposes to collect the eggs of five different bird species from Prince Leopold Island, Coats Island and Devon Island. Data from this project will provide a general indication of overall Arctic marine contamination and an index of contamination of the Arctic marine ecosystem. Results will be used to evaluate the effectiveness of international agreements to reduce pollution.

PROJECT SUMMARY:
The project will collect 15 eggs from five different seabird species – northern fulmar, black-legged kittiwake, thick-billed murre, black guillemot, and glaucous gull – from Prince Leopold Island. Eggs will be analysed for **persistent organic pollutants (POPs)** and some new contaminants, including PBDEs. The data will be used as an indicator of general contamination and changes in the Canadian Arctic marine environment. A monitoring program, established in 1993, for the eastern Low Arctic will continue to collect eggs from thick-billed murres from Coats Island. A study of fulmar eggs from Cape Vera on Devon Island will be compared to results found for northern fulmars from Prince Leopold Island.

HG

LOCATIONS OF WORK:
1. Prince Leopold Island, Nunavut
2. Coats Island, Nunavut
3. Devon Island, Nunavut
4. Ottawa, Ontario

SCHEDULE:
For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:

Project Leader: Birgit Braune
National Wildlife Research Centre,
Canadian Wildlife Service, Environment Canada,
Carleton University (Raven Road)
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K1A 0H3

Phone: (613) 998-6694
Fax: (613) 998-0458
E-mail: birgit.braune@ec.gc.ca

TIME FRAME:
Residue data with a plain language summary of the findings will be made available to the Nunavut Technical Committee on Arctic Contaminants. A **Northern Contaminants Program (NCP)** report will be made available in 2004. Results will be published in a peer-review journal.

Northern Contaminants Air Monitoring: Persistent Organic Pollutants Measurements

? *What are the levels of persistent organic pollutants in Arctic air and how are levels changing over time?*

RELEVANCE:
The primary pathway by which most **persistent organic pollutants (POPs)** enter the Arctic **ecosystem** is through the atmosphere. In 1992 a monitoring program was established to measure the amount and type of POPs reaching the Arctic through the atmosphere. This information is used to negotiate international control agreements. Recent trends have begun to show that many banned **pesticides** have begun to decline while current-use pesticides have increased in Arctic air. Monitoring **temporal trends** of POPs in air is important to assessing the effectiveness of international controls like the **Stockholm Convention** on POPs. This project will continue monitoring these trends in Alert and will complete a chemical analysis of samples from Kinngait.

PROJECT SUMMARY:
This project will help determine if levels of priority **contaminants** that are transported to the Arctic in the atmosphere are changing in response to various national and international initiatives. In order to accomplish this, the project team will continue to collect weekly air samples and analyze them for selected contaminants. Elimination dates in the northern hemisphere will also be estimated by this project. This will require the GloboPOP model, which will allow the researchers to forecast the atmospheric trends of **PCBs** in the northern hemisphere. A new suite of POPs that are a growing concern on an international level and that may affect the Arctic environment will be added to the list of chemicals measured in this project. It is important that information from this project continues to be used effectively at the international negotiating table.

LOCATIONS OF WORK:
1. Alert, Nunavut
2. Kinngait, Nunavut

SCHEDULE:
This is an ongoing monitoring project. For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Hayley Hung
Meteorological Service of Canada
4905 Dufferin St.
Toronto, Ontario
M3H 5T4

Phone: (416) 739-5944
Fax: (416) 739-5708
E-mail: hayley.hung@ec.gc.ca

TIME FRAME:
The collection of samples at Alert and the chemical and data analysis is an ongoing project.

September 2004 – submission of papers on forecasting the atmospheric trends of PCBs in the northern hemisphere and on the influence of climate variation patterns on POP air concentrations.

November 2004 – submission of paper on Kinngait temporal and spatial results.

HG

Air Measurements of Mercury at Alert

What are the inputs of atmospheric mercury to the Arctic ecosystem and are they changing over time?

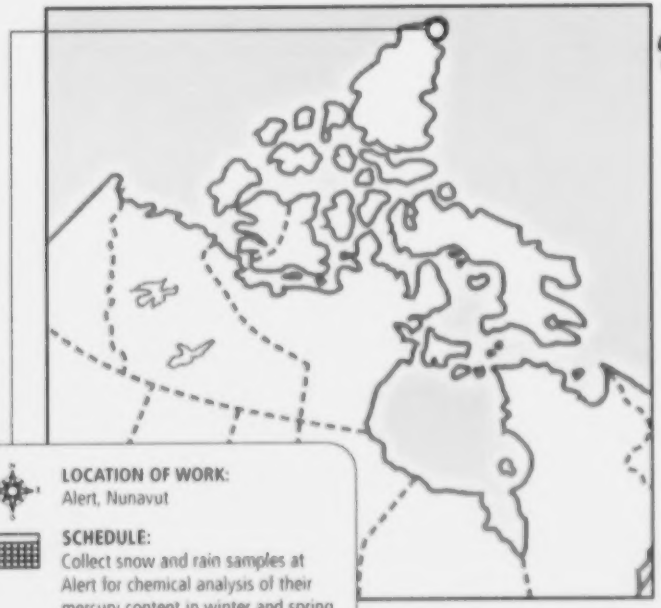
RELEVANCE:

Mercury has been monitored in the atmosphere at Alert since 1995 to investigate why the Arctic **ecosystem** exhibits high levels of mercury **contaminants**. Mercury is of particular concern due to the high levels that have been measured in certain traditional/country foods and the potentially high exposure levels to people who consume these foods. Discoveries made over the past few years at Alert have found that mercury in the air is readily transformed during polar sunrise to a form which is deposited onto snow and ice surfaces. During polar sunrise large amounts of mercury can suddenly be deposited in what is called a mercury depletion event. Once deposited, some of the mercury may find its way into aquatic and marine ecosystems. To gain a better understanding of how mercury enters the Arctic ecosystem, samples of air, particles and snow are all being collected. The project will provide information that is crucial to understanding atmospheric transport, transformation and deposition processes of mercury. This information will also contribute to the evaluation of international control actions to reduce global mercury emissions and protect the Arctic.

PROJECT SUMMARY:

This study will assess **temporal trends** in atmospheric mercury concentrations and deposition processes of mercury through ongoing monitoring of Arctic air. This ongoing project has now collected a continuous record of mercury data that covers the period from 1995 to the present. With every additional year of data the ability to assess long-term changes in mercury levels becomes stronger. The reason for changes in mercury concentrations will also be assessed to help formulate models of atmospheric pathways for mercury. Analysis of air samples will also permit the examination of different forms of mercury to assess how mercury is transformed and then deposited onto snow and ice during mercury depletion events. This data will be used to investigate a link between mercury deposited from the air and high levels present in wildlife. The chemical and physical aspects of atmospheric mercury depletion events will also be examined to assess why these events occur after polar sunrise.

HG



LOCATION OF WORK:
Alert, Nunavut

SCHEDULE:
Collect snow and rain samples at Alert for chemical analysis of their mercury content in winter and spring of 2004. Participate in an international field campaign in Barrow, Alaska in spring of 2004. For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Alexandra Steffen
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Environment Canada
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M3H 5T4

Phone: (416) 739-4116
Fax: (416) 7396-4318
E-mail: Alexandra.Steffen@ec.gc.ca

TIME FRAME:
Nov 2003 – Report on field study findings and continuing measurements at Air Quality Research Branch mid-term review meetings

2003/2004 – Peer-reviewed journal publication(s)

March-April 2004 – Conduct and complete field project in Barrow, Alaska

April 2004 – Continue measurements at Alert, and 2003 mercury data will be finalized

June 2004 – Report on interim results in the annual **Northern Contaminants Program (NCP)** Synopsis of Research Report

Passive Air Sampling for Persistent Organic Pollutants in Cold Environments

Can a device be engineered that is capable of collecting air samples in remote Arctic locations with minimal support?

RELEVANCE:

The primary pathway by which most **persistent organic pollutants (POPs)** enter the Arctic **ecosystem** is through the atmosphere. This enables POPs to travel great distances from their initial sources to the Arctic and other remote locations. Once POPs make it into the **food chain** they **bioaccumulate** and are **biomagnified**, becoming the source of pollutant exposure in northern populations. In 1992 a monitoring program started measuring the amounts and types of pollutants found in the Arctic atmosphere. This program uses active sampling to determine air concentrations of POPs, which requires a pump to pass air through a filter. This system is expensive, labourious to use, and requires electricity in order to run. The current project is looking to develop a simpler, more cost-effective technique that is able to take **contaminants** directly from the atmosphere. Such systems, named passive samplers, already exist; however they have not been tested under Arctic conditions.

PROJECT SUMMARY:

This project will test the performance of new passive air samplers (PAS) and optimize and increase air sampling rates. Much of the testing will use computer-aided fluid flow simulation and wind tunnel experiments. The accuracy of the PAS will be tested by comparing it to high volume and low volume active air samplers at Alert. The project team must also quantify PAS uptake behaviour under Arctic conditions. If the PAS is shown to be effective under Arctic conditions it will be installed alongside active samplers and eventually may replace them. The advantages include having a system that will: have the ability to time-integrate sampling over an extended period, be independent of power supplies, have low production and operating costs, and can function in extreme weather conditions such as those found in northern climates.

LOCATION OF WORK:
Alert, Nunavut

SCHEDULE:
This project will take place over two years. For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Hayley Hung
Meteorological Service of Canada
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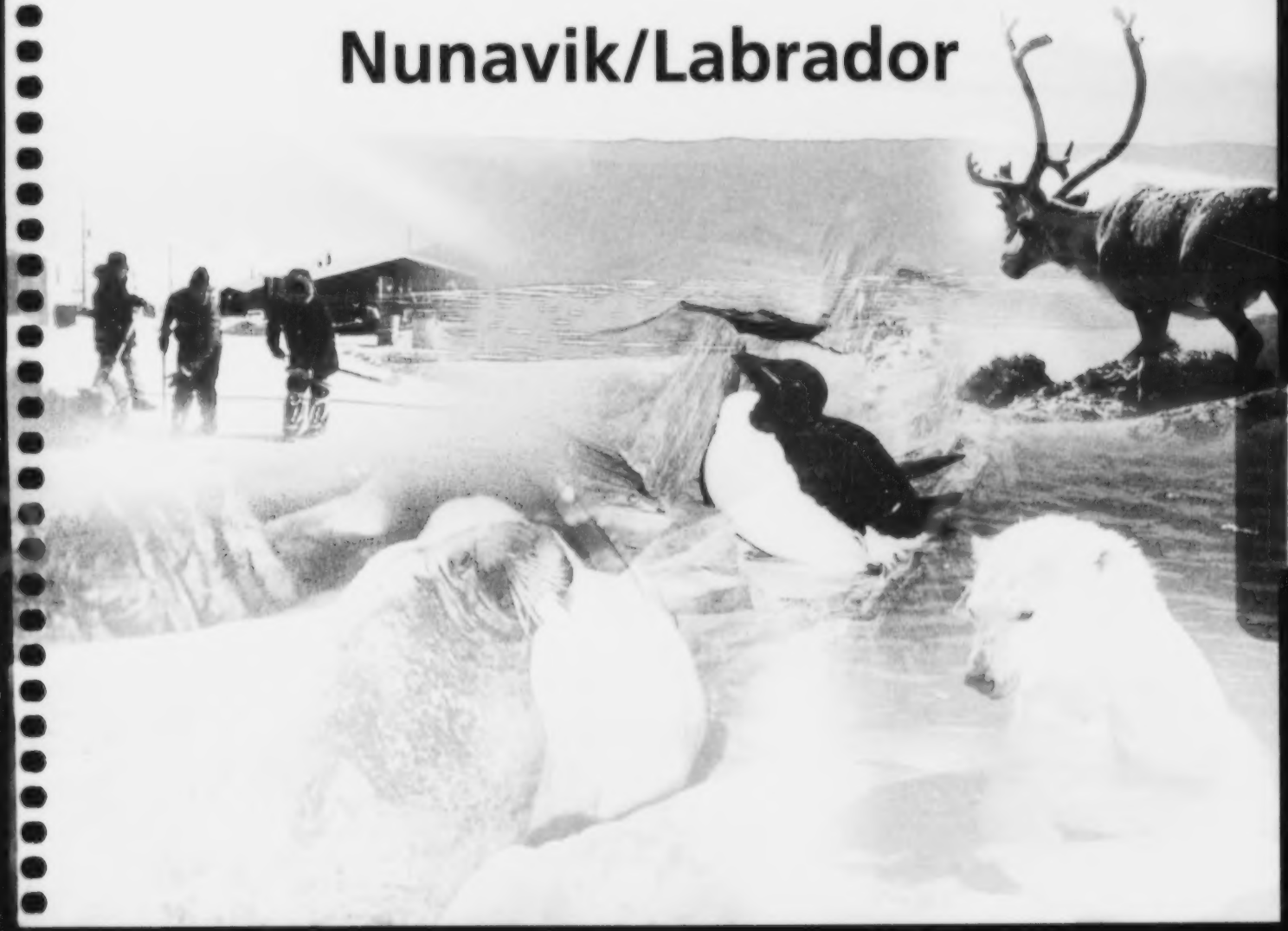
Toronto, Ontario
M3H 5T4

Phone: (416) 739-5944
Fax: (416) 739-5708
E-mail: hayley.hung@ec.gc.ca

TIME FRAME:
Passive Air Sampler testing will take place at Alert during April 2003 – March 2004.

Nunavik/Labrador



Nunavik/Labrador

HG

Effects of Prenatal Exposure to Persistent Organic Pollutants (POPs) and Mercury on the Immune System of Inuit Infants

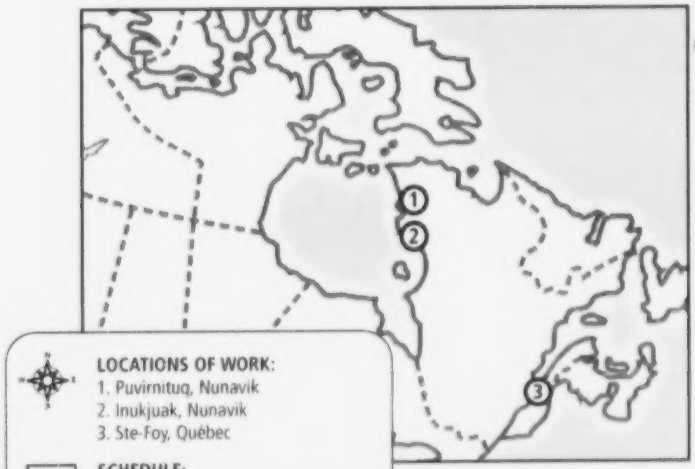
? *What are the effects of prenatal and postnatal exposure to POPs and heavy metals on the incidence of infection in Inuit infants?*

RELEVANCE:

Persistent organic pollutants (POPs) and **mercury** reaching northern regions by **long-range transport** are known to **biomagnify** through aquatic **food chains** and reach relatively high levels in top predator species. Inuit rely heavily on marine foods as part of their diet and are top predators in the food chain. This raises many health questions, especially concerning the youth of the communities. Environmental exposure of infants and children to POPs and **heavy metals** is of concern because the development of their **immune system** is vulnerable, especially while they are still in the womb. It has been shown that **contaminants** can be transferred from the mother to the fetus during pregnancy and to the infant through breast milk. This project will look at the effects of prenatal and postnatal exposure to POPs and heavy metals on the incidence of infection.

PROJECT SUMMARY:

The project will examine the effects of prenatal and postnatal exposure to POPs and mercury on the immune system of Inuit infants, from birth to 12 months of age. Approximately 200 Inuit mothers and their newborns from Nunavik are involved in the study. Preliminary results show that a high incidence of infectious diseases in children is associated with higher exposures to contaminants. The association was strongest with **DDE**, and the effect was most predominant during the first six months of life. The project will complete the final statistical analysis during the 2003/2004 year.



LOCATIONS OF WORK:
1. Puvirnituq, Nunavik
2. Inukjuak, Nunavik
3. Ste-Foy, Québec

SCHEDULE:
For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Éric Dewailly
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Phone: (418) 650-5115 (ext. 5240)
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TIME FRAME:
The majority of the results have been completed but are being verified. Written reports and submissions to scientific articles will be completed by September 2003.

HG

Exposure of Preschool-Age Children to PCBs and Mercury through Fish and Marine Mammal Consumption (Follow-up)

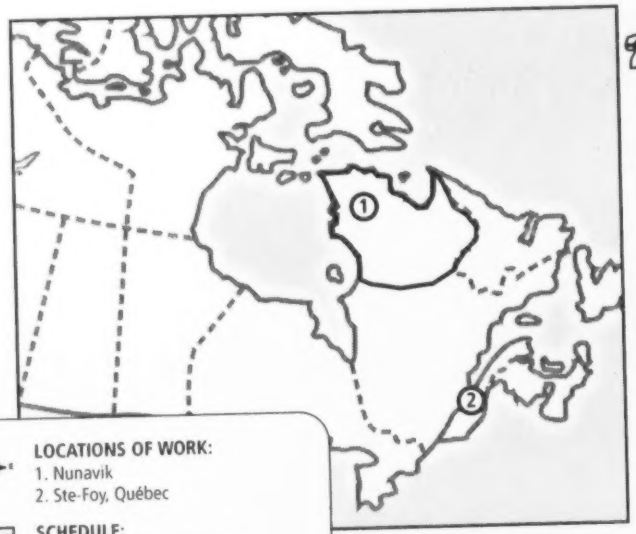
Are Inuit children of preschool age experiencing health effects from exposure to PCBs and methylmercury?

RELEVANCE:

The effects of prenatal exposure in children to **polychlorinated biphenyls (PCBs)** and **methylmercury** through food consumption have been studied in fish-eating populations worldwide. Prenatal exposure to PCBs has been linked to deficits in **neurobehavioural** development during infancy. However, only two studies have provided data for school-age children and these studies did not provide information on those aspects of brain development related to learning difficulties and disabilities. In the Nunavik Inuit population, prenatal exposure to PCBs and methylmercury can result from a maternal diet of certain fish and sea mammals. This study will determine if children exposed to these **contaminants** in the womb, or through their mother's breast milk, are showing any effects as they develop to the age of five.

PROJECT SUMMARY:

This project is examining the long-term consequences of prenatal exposure to PCBs and methylmercury on aspects of brain development in Inuit children. The study examined 104 Inuit children from Nunavik, at 4.5 years of age. Prenatal exposure to PCBs and methylmercury was documented from analysis of cord blood at birth. The study examined the impact of exposure to contaminants on various brain functions that could be related to learning difficulties and disabilities. The data is quite complex and therefore the work is continuing this year. The project will complete six sets of data analysis, collected in the 2001/2002 year. These tests will cover **neuromotor** function, ability to create some mental or visual responses, physical growth and emotional/behavioural analysis. All these results will then be integrated and synthesized.



LOCATIONS OF WORK:
1. Nunavik
2. Ste-Foy, Québec

SCHEDULE:
For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Gina Muckle
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TIME FRAME:
The Synopsis Report, community information and scientific publications will be produced by April 2004.

Effects of Exposure to Persistent Organic Pollutants (POPs) and Heavy Metals on Infectious Disease Incidence in Inuit Preschool Children

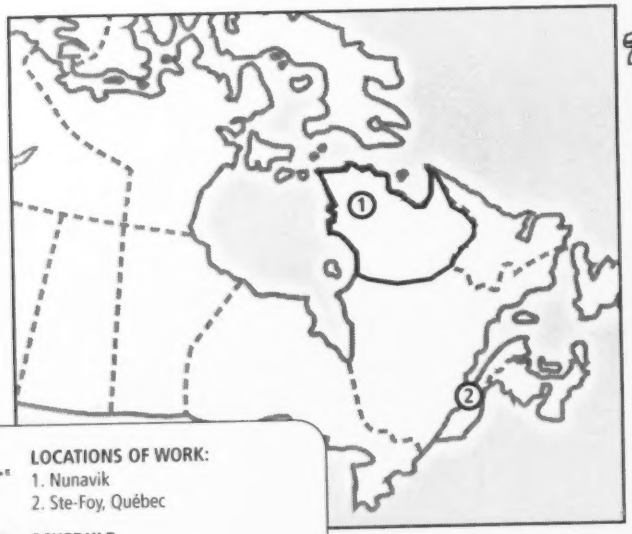
How does prenatal exposure to persistent organic pollutants (POPs) and heavy metals affect the incidence of infectious diseases in Inuit preschool children?

RELEVANCE:

Substantial information is available on the presence of **persistent organic pollutants (POPs)** and **heavy metals** in northern marine traditional/country food sources. These **contaminants** reach northern regions by **long-range transport** mainly through the atmosphere, and **bioaccumulate** in the Arctic **food chain**, reaching their highest levels in top predator species, such as polar bears, seals, walruses and beluga whales. Nunavik Inuit rely heavily on these and other marine animals for food. Consumption of sea mammal fat, in particular from ringed seals and beluga whales, leads to levels of POPs and heavy metals in Inuit that exceed those of southern Québec populations by two to 10 times. The contaminants can be transferred to the fetus during pregnancy and infants during breastfeeding. Related studies have shown that prenatal exposure to some contaminants, for example **DDE**, may be related to the incidence of infections in Inuit infants.

PROJECT SUMMARY:

This project will assess the effects of prenatal exposure to POPs, and heavy metals and compare it to the incidence of infectious diseases in preschool children from Nunavik. This project includes reviewing, archiving and managing information in the medical charts of 480 Nunavik children between 5 and 7 years of age. The project will also complete required data entry and the coding of some questionnaires. The analysis of the data will provide the information necessary to relate contaminants to the incidence of infections and on the severity of these infections. The analysis will also allow for an evaluation of the age at which children are most vulnerable.



LOCATIONS OF WORK:
1. Nunavik
2. Ste-Foy, Québec

SCHEDULE:
For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Éric Dewailly
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TIME FRAME:
Interpretation of results, and writing reports and scientific articles will be completed by the end of 2004. Results will be summarized in the **Northern Contaminants Program (NCP)** Synopsis of Research Report and in information developed for the communities.

HG

Time Trends of Mother/Child Exposure to Contaminants in the Canadian Arctic: Nunavik Component

? ***What levels of persistent organic pollutants (POPs) and methylmercury are found in the Ungava Bay population of Nunavik, and are these levels changing over time?***

RELEVANCE:

Contaminants, such as **persistent organic pollutants (POPs)** and **methylmercury**, have been found in elevated concentrations in the northern Canada. The major concern with this discovery is that many of the contaminants are also found in **food chain** species which comprise a large part of the Inuit diet. There is a need to determine if the levels of contaminants are fluctuating or remaining static, and if there are changes in their causes. Between 1993 and 1996, samples were collected from approximately 230 people in Ungava communities. These samples were analyzed for contaminants. However, it is also known that there are several beneficial effects from the nutrients in traditional/country food. Other studies have found data on some subtle negative health effects in infants related to their prenatal exposure to contaminants. The priority contaminants when studying maternal and cord blood are POPs and methylmercury because of the susceptibility of the fetus to exposure.

PROJECT SUMMARY:

This project will analyze maternal and cord blood in order to determine the levels of POPs and methylmercury within the population of Ungava Bay of Nunavik. The analysis will involve comparing recent data with data that was collected between 1993 and 1996. There will be an attempt to collect data from a similar geographic distribution to that of the previous project to be able to properly compare the data. The new blood samples will be collected from 30 maternal/cord sample pairs at Tullatavik hospital in Kuujjuaq. These will be analyzed for 14 **PCBs** and 11 **chlorinated pesticides**. The samples will also be analyzed for fatty acids and **selenium** in order to determine whether there have been changes to the mother's nutritional profile. **Lead** will also be measured to evaluate the effectiveness of the lead shot ban in Ungava.

LOCATIONS OF WORK:
1. Kuujjuaq, Nunavik
2. Ste-Foy, Québec

SCHEDULE:
For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
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TIME FRAME:
Time trend data will be communicated to communities and governments. A Synopsis Report will be produced for the **Northern Contaminants Program (NCP)** and scientific articles published.

The Nunavik Health Study: Environmental and Dietary Component

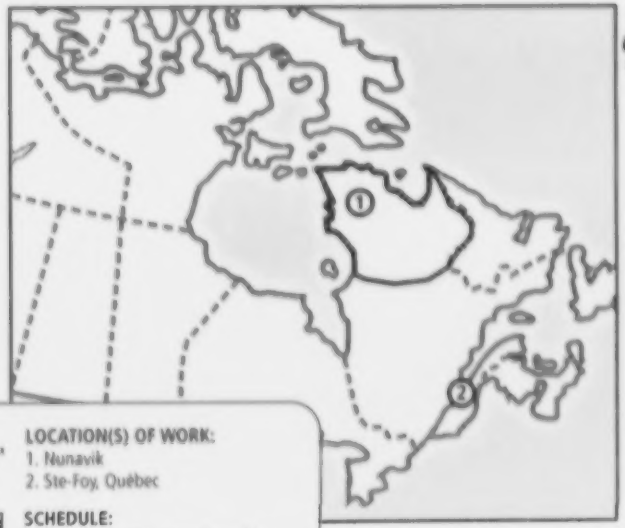
What is the significance of contaminants among many other factors such as the environment, diet, and living conditions on the development of chronic disease in the Inuit population?

RELEVANCE:

Over the last ten years, there has been considerable effort made to monitor the levels of **contaminants** in fish and wildlife collected from different regions in northern Canada. A database has been established from the information collected over the years, mostly concerning contaminants in traditional/country food sources important for northerners. Studies have shown that the traditional/country foods of Inuit, especially marine mammals, contain contaminants that may contribute to the development of specific chronic diseases in adults, such as diabetes and **cancer**. Contaminants are, however, only one of several factors that influence the occurrence of such diseases. Dietary habits, genetic factors, radiation exposure, indoor climate, and lifestyle characteristics such as smoking, alcohol, and physical exercise are also very important. A Nunavik Health Survey is being planned by the Québec government in the fall of 2004 to look at these various factors; this will repeat the previous survey which took place in 1992. The new survey, which focusses on general health, will also form part of the Canadian component of the International Inuit Cohort Study.

PROJECT SUMMARY:

The project will ensure that a strong contaminants component is included in the Nunavik Health Survey. By repeating the 1992 survey, trends in dietary habits among adults of the same age and differences between age groups will be assessed. The survey will compare the incidence and prevalence of certain cardiovascular diseases, diabetes and selected types of cancer among Nunavik Inuit adults with blood levels of environmental contaminants. The results of these comparisons will help determine if there is an association between any of these factors. The study will include a component designed to collect detailed dietary information: Inuit interviewers will be trained, and sample protocols will be developed. Field testing will be carried out with 50 participants, and data analysis will take place to assess the feasibility of a larger, more complete project, which would involve 1000 participants. The field work will be used to finalize the complete protocol.



LOCATION(S) OF WORK:
1. Nunavik
2. Ste-Foy, Québec

SCHEDULE:
Field testing will be conducted in February 2004. For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
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TIME FRAME:
All the research tools, field testing and feasibility analysis for the larger project will be completed by March 2004.

HG

The Effects of the Interactions of Methylmercury, PCBs, Selenium, Vitamin E and Omega-3 Fatty Acids on Cardiovascular Risk Factors

Do nutrients that are found in traditional/country food, such as omega–3 fatty acids and selenium, counteract the negative effects of mercury?

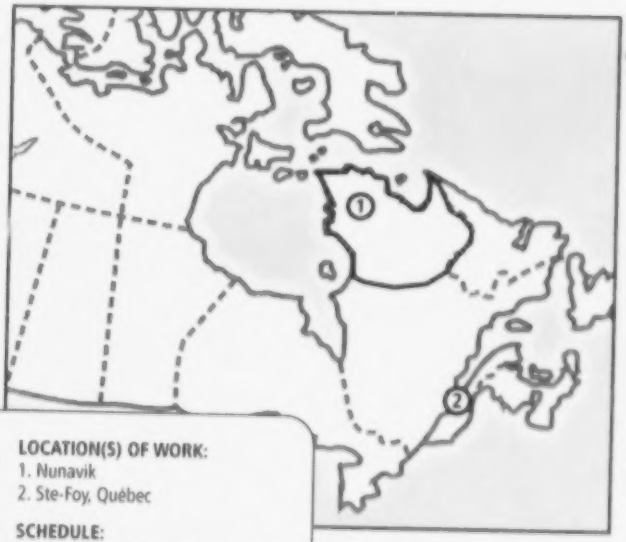
RELEVANCE:

Oxidative stress is a chemical process in which a highly oxidized environment is created within a cell and the cell is forced into a highly activated state due to loss of control of their regulatory systems. It is important in a number of processes such as ageing, **cancer** development and cardiovascular disease. Studies have shown that **mercury toxicity** involves the oxidative stress pathway. Despite the high levels of mercury exposure, obesity, and smoking, Inuit from Nunavik have very low cardiovascular disease death rates. This observation has been attributed to their traditional/country food diet. Certain nutrients in traditional/country food, such as omega-3 fatty acids and **selenium**, have been shown to counteract the toxic effects of mercury. The project proposes to assess the number of factors contained in traditional/country food that possess the ability to counteract mercury's toxicity.

PROJECT SUMMARY:

The project will assess the levels of the factors that oppose mercury's toxicity in Nunavik Inuit. These factors include proteins found in urine (known as isoprostanes), vitamin E found in plasma, and the **polypeptide** known as glutathione. The proteins found in urine will be used to determine the oxidative stress in the body, because it is the most sensitive, reliable, and invasive analysis ***in vivo***. The possible oxidative stress effects associated with mercury and **PCB** exposure will be assessed.

HG



LOCATION(S) OF WORK:
1. Nunavik
2. Ste-Foy, Québec

SCHEDULE:
For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:

Project Leader: Pierre Julien
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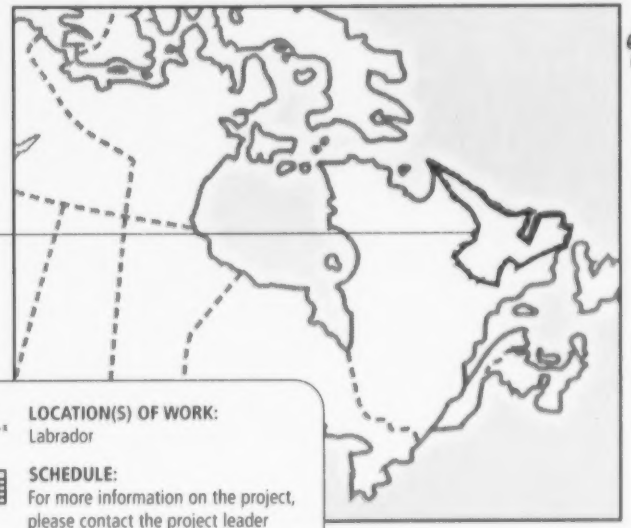
TIME FRAME:
April 2003 – March 2004. Experimental studies will be completed. Results will be included in the **Northern Contaminants Program (NCP)** Synopsis of Research Report and scientific publications.

Deliver CACAR II Information to Labrador Inuit and Participate in the Common Northern Survey

? *What can be done to improve efforts in communicating contaminants information to Labrador Inuit?*

RELEVANCE:
One of the objectives of the **Northern Contaminants Program (NCP)** is to reduce, and if possible eliminate **contaminants** in traditional/country foods, while providing information to the communities that will help them make educated choices in their food use. This project will increase awareness of the of **Canadian Arctic Contaminants Assessment Report II (CACAR II)** to Inuit from Labrador and will help ensure that they are able to make wise food choices. The latter is especially important because of local concerns such as **PCB** contaminants at Saglek Fjord.

PROJECT SUMMARY:
This project will deliver CACAR II information to seven isolated communities in Labrador. Project team members will attend Inuit Tapiriit Kanatami (ITK)/Nunavut workshops to learn about recent health study information that could potentially affect the Labrador region. The main focus of the project will be to develop a communications strategy, through various media, in order to pass on difficult information to the residents of Labrador. Approaches will include workshops, open houses and training sessions that will assist Inuit from Labrador in making informed decisions about the environment and their health. In addition, a questionnaire will be developed on basic awareness about contaminants. Labrador research staff will participate in the collection and analysis of regionally comparable data on communications issues (awareness, perspectives, concerns) regarding contaminants in the North and the activities of the NCP. Approximately 1% of the population of Labrador will be asked to participate in the survey.



LOCATION(S) OF WORK:
Labrador

SCHEDULE:
For more information on the project, please contact the project leader directly.

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TIME FRAME:
The first year of the project will be completed by April 2004.

Conducting and Evaluating Communication Initiatives in Nunavik: Follow-up to the Nunavik Cohort Study, Delivering CACAR II Messages and Participating in a Northern Communications Survey

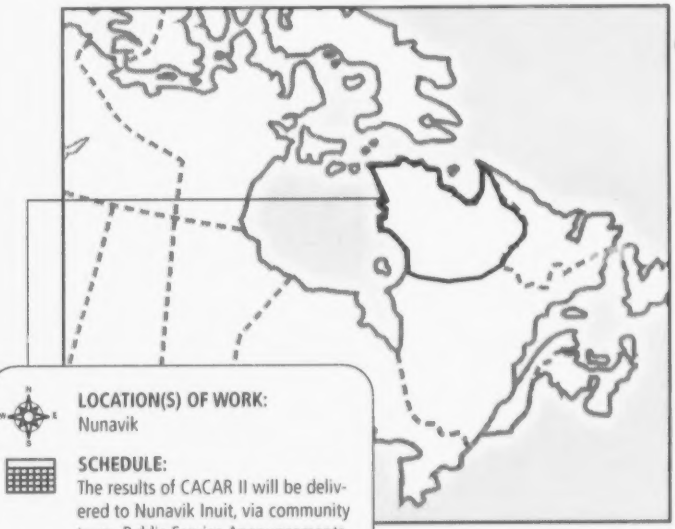
What is the best way to inform the residents of Nunavik about contaminants issues?

RELEVANCE:

The **Northern Contaminants Program (NCP)**, Aboriginal partners, and participating researchers have put a great deal of effort and resources in the communication and education about topics related to **contaminants** and traditional/country food in northern communities. There is however a concern whether knowledge of the risks posed by environmental contaminants found in the **food chain** of the North is being communicated properly. It is important that messages being sent to the communities are adapted or corrected in a timely manner to ensure that the information that the communities do receive is comprehensive and correct. This project will assess the effectiveness of one strategy utilized to deliver the results of the Inuit infant cohort study in Nunavik. It will also participate in a northern communications survey, and will communicate relevant contaminants information to **Nunavimmiut**.

PROJECT SUMMARY:

The project will assess the effectiveness of the multiple method approach used to deliver information, and it will determine if the information being sent is understood by the communities. The assessment will involve gathering community perspectives and questions, which will be used to adjust the Inuit infant cohort study. The project will also conduct a short survey on randomly selected women of child-bearing age in order to assess message reception, awareness and perception of the results from the Inuit infant cohort study. Furthermore, it will develop a radio dialogue which will interpret relevant information in the **Canadian Arctic Contaminants Assessment Report II (CACAR II)** to Nunavimmiut.



LOCATION(S) OF WORK:
Nunavik

SCHEDULE:
The results of CACAR II will be delivered to Nunavik Inuit, via community tours, Public Service Announcements (PSAs), the Inuit Tapiriit Kanatami (ITK) Inuit Newsletter, posters and magnets. For more information on the project, please contact the project leader directly.

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TIME FRAME:
Develop strategy for the communication of Nunavik study results applicable to other regions, and participate in the development and application of the common survey. Data analysis to be conducted in 2004/2005.

Nunavik Nutrition and Health Committee Communications and Coordination Program

How can information on contaminant research be best communicated to communities in Nunavik?

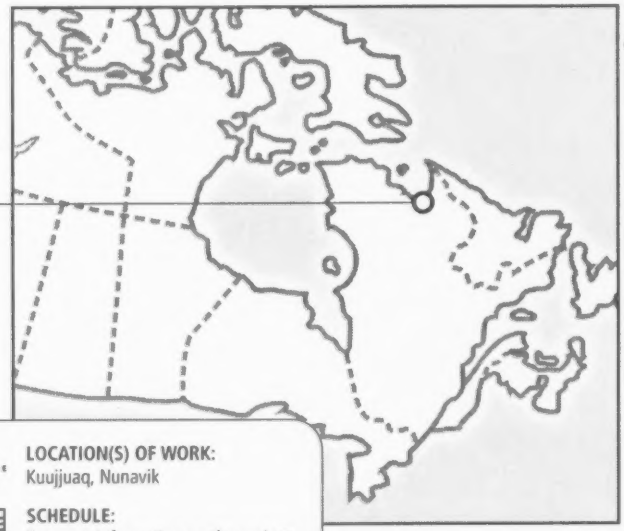
RELEVANCE:

The Nunavik Nutrition and Health Committee (NNHC) was established in 1988, initially as the **PCB** Resource Committee. The committee deals with issues related to food, **contaminants**, the environment and health in Nunavik. Through the years, the NNHC has broadened its view and has taken a more holistic approach to the environment and health issues, considering both the benefits and the risks. The NNHC acts as the authorized review and advisory body for health and nutrition issues for the region. It also provides guidance and acts as a liaison for researchers and agencies, directs work on priority issues, and communicates to and educates the public on health and environment topics and research projects. All NNHC activities are conducted with the goal of protecting and promoting public health in Nunavik.

PROJECT SUMMARY:

This year the committee proposes to focus on the development of communication strategies. The project will provide the general population and health workers with background information to help them understand and grasp environmental health nutrition and contaminants research, objectives, and results. Elements of public concern that have not been addressed will be compiled and research activities will be steered towards providing data needed to address these concerns. Through the undertaking of public communications of environmental health data, the project will help develop regional communications and evaluation strategies for this information. Researchers will be assisted in translating their data into meaningful information for the public.

The committee will also focus its attention on completing special activities linked with the studies on infant development. The infant development project will be evaluated based on the participants' comprehension of the information given during the tour and the second communication campaign. The committee will be involved in a survey of awareness about contaminants, and perception and understanding, which will be carried out in Nunavik communities.



LOCATION(S) OF WORK:
Kuujjuaq, Nunavik

SCHEDULE:
For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
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TIME FRAME:
An annual report will be delivered to the NCP in March 2004.

Other Locations

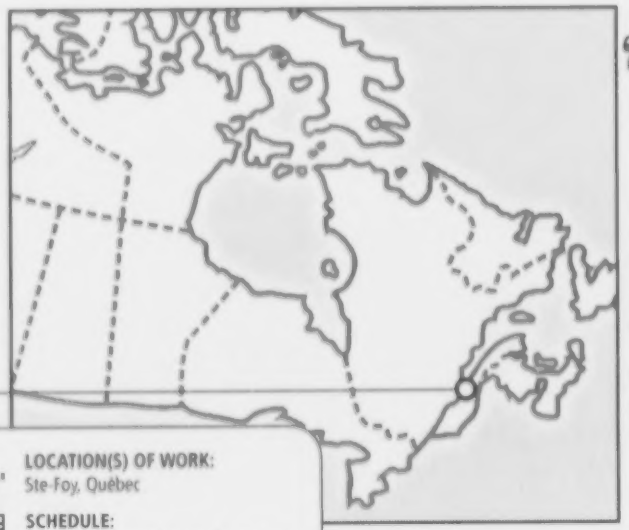
Other Locations

Effects of an Environmentally Pertinent Mixture of Persistent Organic Pollutants (POPs) on Reproductive Development and Health in Pigs and Rats

? *What are the effects of exposure to persistent organic pollutants (POPs) on mothers and their children?*

RELEVANCE:
Many studies over the years have looked at **persistent organic pollutants (POPs)** and have observed the effects of exposure, through diet, on affected populations. Although the actual **toxicity** of these **contaminants** to human health is unclear, there is concern that exposure in humans may cause harm to the reproductive system, reducing fertility and possibly leading to various **cancers**. The fetus is particularly sensitive to the **endocrine-disrupting effects** of POPs, since much reproductive development occurs in the womb. This information could prove to be very important in the next few years when children who were exposed to the highest levels of contaminants ***in utero*** and while breastfeeding reach puberty. Since it is not ethical to conduct experiments on humans to determine the actual effects of the contaminants in question, animals will be used in the laboratory experiments. This project will determine if chronic exposure to a mixture of POPs, known to **bioaccumulate** in the Arctic **food chain**, harms fetal development and reproductive health in rats.

PROJECT SUMMARY:
This project will examine the effects of POPs on the development and post-pubertal function of the reproductive system in pigs and rats. The data from the study will be used to establish the **toxicological** response in these animals to an environmentally relevant, defined mixture of **PCBs** and other contaminants on fetal development. This information should provide insight into what physiological mechanisms may be causing the observed reproductive effects in offspring. The contaminant mixture is designed to match the contaminant levels found in ringed seal blubber. This animal study will provide important information about whether human exposure to a mixture of contaminants found in the Arctic food chain may be harmful to their reproductive, hormonal, and developmental health.



LOCATION(S) OF WORK:
Ste-Foy, Québec

SCHEDULE:
For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Janice Bailey
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TIME FRAME:
The project will be completed by April 2004. Results will be included in the **Northern Contaminants Program (NCP)** Synopsis of Research Report and scientific publications.

Effects of Mixtures of Persistent Organic Pollutants (POPs) on the Immune System in Rats

How do persistent organic pollutants (POPs) affect the function of the immune system?

RELEVANCE:
Traditional/country foods of northern Aboriginal populations contain a mixture of **contaminants** which are suspected of disrupting human immune function. Although the actual **toxicity** of these contaminants on the human **immune system** is unclear, there is concern that exposure may reduce the body's resistance to disease. The fetus and infants are particularly sensitive to the effects of **persistent organic pollutants (POPs)**, since much immune system development occurs in the womb during pregnancy and during early maturation following birth. This period of growth is also the time when children are most susceptible to contaminant exposure from their mothers during pregnancy and through breast milk as an infant. In this study, rats are used to determine the toxic effects of POPs on immune system development.

PROJECT SUMMARY:
The goal of the project is to determine if prenatal and infant exposure to a mixture of POPs, known to **bioaccumulate** in the Arctic **food chain**, could potentially be harmful to fetal development and immune function. The study will assess the effects of complex mixtures of contaminants on the developing immune system by analyzing young male rats that were exposed during their time in the womb and through breast milk. The contaminant mixture to be used is designed to match the contaminant levels found in the fat of ringed seals. The mechanism by which POPs affect the cells in the immune system will be carefully observed to determine what causes the suppression of the immune function. The results of this study will provide valuable information about the effects contaminants might have on the developing immune systems of rats and, therefore, to develop further understanding of the potential risks contaminant exposure will have on Inuit children and their ability to resist illness.

LOCATION(S) OF WORK:
Ste-Foy, Québec

SCHEDULE:
For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
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TIME FRAME:
The project will be completed by the end of March 2004.

HG

Health Effects in Rodents from Exposure to Major Components of a Chemical Mixture

? *What types of health effects do three major classes of contaminants, found in northern traditional/country foods, cause in people?*

RELEVANCE:

There is growing public and scientific concern that the health of Arctic peoples may be compromised by exposure to **persistent** environmental **contaminants**. The fetus and infants are especially sensitive to these contaminants, which have been associated with a wide range of **toxic** effects, including learning and developmental deficiencies. Although Arctic peoples are exposed to a wide variety of contaminants, most studies on adverse effects test single chemicals or simple mixtures. The results of this study using rodents will provide important information about the potential health effects of specific chemical classes found in human blood, and derived from foods containing contaminants.

PROJECT SUMMARY:

This project will investigate several **neurotoxic** effects in rodents caused by specific components of a chemical mixture. The mixture that will be administered to the rats will be based on blood levels measured in people in the Arctic. The highest and lowest doses of each component are close to the levels that cause maternal toxicity, and those found in human umbilical cord blood, respectively. The chemical mixtures will be fed to laboratory rats during pregnancy and lactation, and the offspring will be tested for a broad range of **neurobehavioural** measures including memory, learning capacity, and coordination. The results will be used to determine if any of the components are specifically responsible for particular neurobehavioural effects. These results will then be compared to the human studies from the Canadian Arctic population. The results from this study will provide public health officials with a better understanding of the potential detrimental effects of exposure to mixtures of persistent environmental contaminants relevant to Arctic peoples.

HG

LOCATION(S) OF WORK:
Ottawa, Ontario

SCHEDULE:
For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
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Ottawa, Ontario
K1A 0L2

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TIME FRAME:
Growth, development and early **neurodevelopmental** measures, and early behavioural test data will be available February 2004; all data will be available April 2004. Preliminary results will be provided to the **Northern Contaminants Program (NCP)**. Completed studies will be published in peer-review journals.

HG

Effects of Dietary Components on Methylmercury Toxicity in Male Rats

What are the effects of dietary nutrients, found in traditional/country foods, on methylmercury toxicity?

RELEVANCE:

The ringed seal is the most abundant marine mammal species in the Canadian Arctic and is a major part of the Inuit traditional diet. The ringed seal is also very rich in beneficial nutrients, oil, vitamins and minerals. However, elevated levels of **mercury** are commonly found in its meat. Elevated levels of mercury and **methylmercury** have been reported in the terrestrial, freshwater and marine **biota** of northern Canada. Traditional/country foods appear to be the main source of human exposure to these **contaminants**. However, these foods also are important sources of many beneficial nutrients, some of which may provide some protection from the effects of methylmercury. It is important to identify the dietary factors which could influence methylmercury **toxicity**, and to understand possible interactions between nutrients and contaminants in the Inuit diet.

PROJECT SUMMARY:

The project will examine the effects of certain nutrients and dietary fibres on the accumulation and toxicity of methylmercury in male rats. Previous studies show that **selenium** alone does not appear to provide protection caused by ***in utero*** methylmercury. Vitamin E alone or combined with selenium, however, does appear to prevent fetal mortality. Other studies show that bran can increase the rate of **demethylation** of methylmercury by microorganisms normally found in the digestive system. The fecal excretion of mercury is also increased by the intake of bran. This project will identify the dietary factors which could influence methylmercury toxicity and help understand possible interactions between nutrients and contaminants in the diet. The three nutrients and dietary fibres of interest are selenium, vitamin E and phytate. To determine the effect of these nutrients and fibres, 14 groups of rats will be fed diets containing specified amounts of each nutrient or fibre. Mercury concentrations and neurological **biomarkers**, such as programmed cell death and the detection of certain proteins or **DNA** sequences, will be determined. Results from this study will help describe the risk of exposure to mercury from the consumption of traditional/country foods in the Inuit diet.

HG

LOCATION(S) OF WORK:
1. Ottawa, Ontario
2. Ste-Anne-de-Bellevue, Québec

SCHEDULE:
For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Laurie Chan
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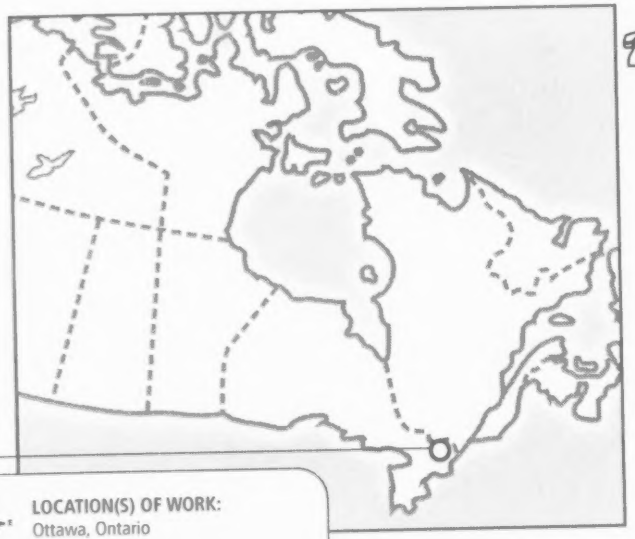
TIME FRAME:
Results will be communicated to the relevant Aboriginal partners, territorial health departments and Health Canada for future risk assessment and risk management. A progress report and a final report will be prepared. Results will be presented in the **Northern Contaminants Program (NCP)** Synopsis of Research Report and in scientific publications. The project will be completed by April 2004.

Health Effects of Chlordane-related Food Contaminants

How do three specific residues of chlordane cause changes in tissues that lead to adverse health effects?

RELEVANCE:
Residues of the pesticide **chlordane** and its **metabolites** in food are a growing concern in the Arctic due to recent studies which have determined that species in the Arctic marine **food chain** contain these residues. Many of these species are traditional/country foods for the Arctic population. While some information exists on the **toxicity** of the original chlordane mixture, there is virtually no information on the toxicity of specific chlordane-related metabolites and constituents that are frequently detected in traditional/country foods. Data from these toxicology studies will assist in making informed decisions about the risks associated with human exposure to these contaminants, and will be used to calculate the maximum level of exposure to these **contaminants** that is safe for humans.

PROJECT SUMMARY:
This project will assess changes to the genes in archived liver tissue from rats previously exposed for 28 consecutive days to three chlordane contaminant residues: *trans*-nonachlor, *cis*-nonachlor and oxychlordane. With the use of a laboratory technology known as **DNA** microarrays, the researchers will be able to screen thousands of genes simultaneously and follow multiple cellular pathways to determine how chlordane affects body tissue. The data may also be used to determine what specific effects occur to the molecules in the rat tissues when exposed to chlordane. The data can also be used to determine what kinds of different effects are caused by the various chlordane contaminants. Ultimately, the project will contribute an understanding of how health effects in rodent studies may relate to effects on humans exposed to these chlordane contaminants, and contribute to setting safe levels of chlordane contaminants in foods.



LOCATION(S) OF WORK:
Ottawa, Ontario

SCHEDULE:
For more information, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Ivan Curran
Toxicology Research Division
Health Canada
Postal Locator 2204D2
Tunney's Pasture
Ottawa, Ontario
K1A 0L2

Phone: (613) 957-3052
Fax: (613) 941-6959
E-mail: ivan_curran@hc-sc.gc.ca

TIME FRAME:
Completion of the microarray analyses 2003/2004. The data will be published as scientific articles, and summarized in the **Northern Contaminants Program (NCP)** Synopsis of Research Report.

HG

Characterizing Risks Associated with Prenatal Exposure to Methylmercury using a Rodent Model

What type of brain development effects can occur if the mother consumes a diet containing high levels of mercury during critical periods of pregnancy?

RELEVANCE:

Previous studies have looked at **contaminants** in the Arctic and have traced their entrance into the **food chain**. It has been discovered that there appear to be time periods during pregnancy when the fetus is particularly sensitive to contaminant exposure. Early research indicates that the amount of **mercury** consumption in one meal may also be an important determinant. If a pregnant woman eats a lot of fish with very low levels of mercury, then the child may not display any noticeable effects. If, however, the woman eats less fish but those fish have higher mercury concentrations, then the child may experience mild effects. This project will be used to create sound health advice regarding a woman's diet during pregnancy. It will also assist in the creation of a human health guideline for **methylmercury**, that includes an adequate safeguard for the most sensitive stage of life.

PROJECT SUMMARY:

This project will investigate the effects of methylmercury on the brain of rats during critical periods of ***in utero*** development. Data from previous health studies on the effects of mercury on prenatal brain development will be used to identify the types of effects being caused by this contaminant. Mercury levels in blood will be measured and compared with **neurobehavioural** test results on the rat offspring. These tests will consist of looking at sensory systems, motor functions and complex learning. The tissue will be archived for potential future analyses.

HG

LOCATION(S) OF WORK:
1. Ottawa, Ontario
2. Rochester, New York

SCHEDULE:
For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Mike Inskip
Office of the Director, Bureau of Environmental Health Science
Healthy Environments and Consumer Safety Branch
Health Canada
Postal Locator 0803B
Environmental Health Centre
Ottawa, Ontario
K1A 0L2

Phone: (613) 957 1885
Fax: (613) 941 9238
E-mail: mike_inskip@hc-sc.gc.ca

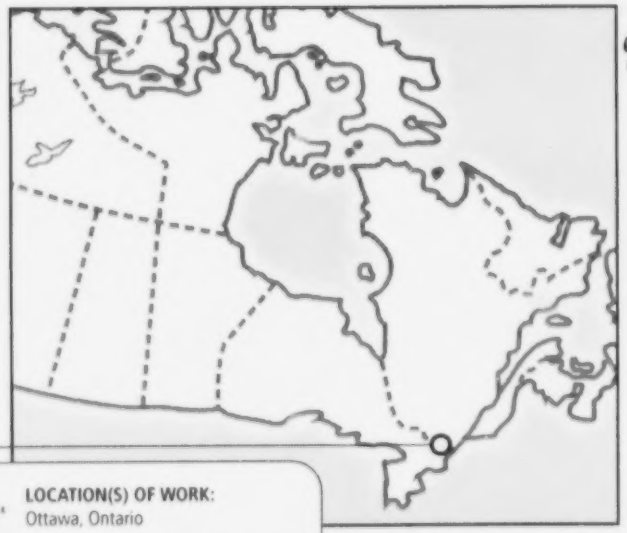
TIME FRAME:
Reports will be made available as the data analysis is completed. It is anticipated that preliminary data on methylmercury blood levels will be the first data available. There will be a workshop held in Rochester or Ottawa. Completed studies will be published in peer-reviewed journals and forwarded to the **Northern Contaminants Program (NCP)**.

Effective Translation and Use of Inuit-specific CACAR II Data in International, Circumpolar, National and Local Fora

How can an Aboriginal organization make sure that Inuit-specific contaminant information is understood at the international and national levels?

RELEVANCE:
In order to assess the performance of international, circumpolar and regional initiatives and provide relevant and useful information on international activities to Inuit communities and the general public, Inuit Circumpolar Conference (ICC) Canada will undertake a series of nested activities. This will ensure that the Inuit-specific results within the **Canadian Arctic Contaminants Assessment Report II (CACAR II)** is fully reflected in international, circumpolar and regional decision making and that the data are effectively used to review and move relevant initiatives forward.

PROJECT SUMMARY:
This project will develop four products: an Inuit-specific **mercury** case study related to Inuit exposure, diet and health concerns to use in international, circumpolar and regional initiatives; a comparison and analysis of Inuit-specific CACAR II **contaminant** data with global data, and an assessment of the regional population specific contaminant levels, activities and guidelines that other countries use to monitor exposure; a translation of CACAR II into information packages to distribute to other countries to help them develop their National Implementation Plans; and efforts to ensure that data from CACAR II is considered in international policy decisions and activities.



LOCATION(S) OF WORK:
Ottawa, Ontario

SCHEDULE:
For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Stephanie Meakin
Inuit Circumpolar Conference (ICC) Canada
170 Laurier Ave West
Suite 504
Ottawa, Ontario
K1P 5V5

Phone: (613) 563-2642
Fax: (613) 565-3089
E-mail:smeakin@attcanada.ca

TIME FRAME:
An entry in the quarterly Policy Journal SILARJUALIRINIQ including background and a status report on regional, circumpolar and international **heavy metals** and **persistent organic pollutants (POPs)** activities will be ready by March 2004.

Five-Year Inuit Communication Strategy

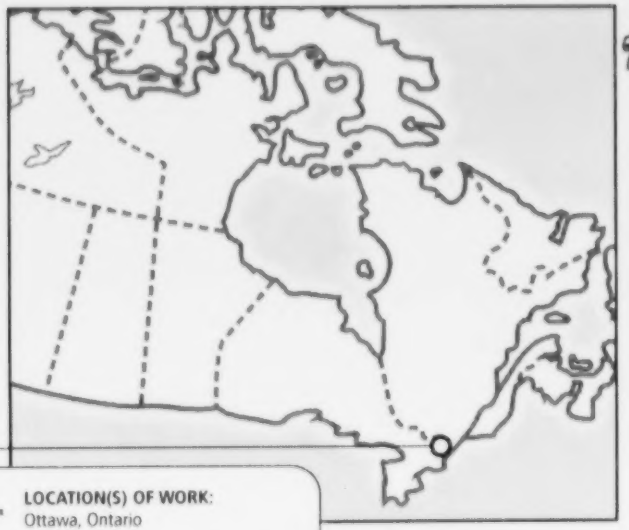
How can we make sure that Inuit-specific communications are organized and planned according to a co-ordinated strategy?

RELEVANCE:

Much of the research that is funded by the **Northern Contaminants Program (NCP)** is very scientific and technical, which makes it a challenge to fully comprehend in its original format. Through different media, the NCP has been attempting to deliver this information in a comprehensive way to the people who are affected by the information and to the communities at large. The project's goal is to ensure that Inuit communities continue receiving messages that concern them in an understandable format. The messages must also address their common perspectives, concerns and needs.

PROJECT SUMMARY:

This project is putting together a strategy that will help in communicating **contaminant** information to the Inuit population. It will include advising the National Inuit Environment Committee and creating two "roundtables." The first roundtable will address a ' % Inuit wide survey, discuss the Nunavik cohort results in a workshop, and gain feedback from community tours, public service announcement (PSA) questionnaires and on the Inuit Highlights Report. The second roundtable will develop a long-term strategy to communicate contaminant information to Inuit. The project will provide a 'blueprint' to the NCP of what will be needed to effectively communicate with Inuit regions.



LOCATION(S) OF WORK:
Ottawa, Ontario

SCHEDULE:
December 2003 – February 2004 tours will be conducted. For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Eric Loring
Inuit Tapiriit Kanatami (ITK)
170 Laurier Ave West, 12th floor
Ottawa, Ontario
K1P 5V5

Phone: (613) 238-8181
Fax: (613) 233-2116
E-mail: loring@itk.ca

TIME FRAME:
2003
April-June: development of proposals
July: meeting with Inuit forum group
July-August: conduct projects
December-February: meeting with Inuit forum group

2004
February: deliver draft Inuit communication strategy to the NCP

Provision of Technical Survey Support for the Design, Development and Application of a Common Northern Communications Survey in Inuit Regions

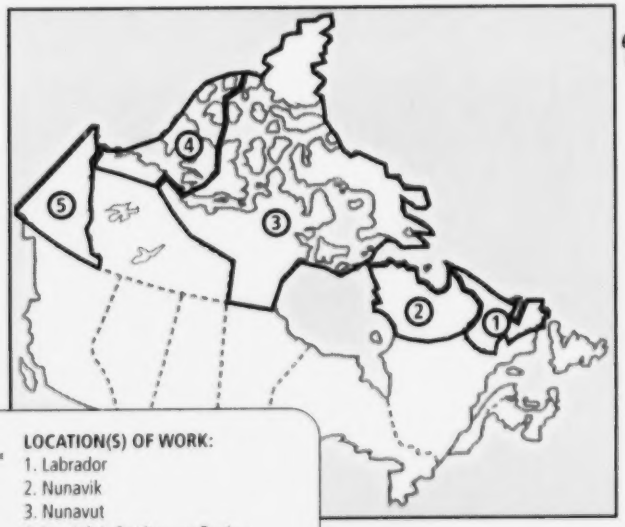
What are the needs and questions of the northern population regarding contaminants and how can they be better addressed?

RELEVANCE:

During the **Northern Contaminants Program (NCP)** Phase II, information was collected that contained critical results for northerners regarding their health and their diet. One of the goals of this project is to provide northerners with this information in order to enable them to make informed decisions about their diet in relation to **contaminants**. In order to achieve this goal the project will gather the original information contained in the scientific research results and disperse it in an accessible and consolidated manner. Regional programs have dispersed such information previously; however it has not been followed up with a study to determine whether the information was understood by the recipients. It is critical that the methods of relaying information to northerners are evaluated and that the priorities at the regional and national scale are met.

PROJECT SUMMARY:

This project will aid in the development of methods and questions so that the information collected under these initiatives may be comparable regionally and nationally. This questionnaire development will occur through Inuit regional communication survey initiatives that will then be used to design methodological approaches for regional surveys. The surveys aim to gain a better understanding of the awareness, perception and understanding of contaminants by northern populations. This information will be used to enhance cooperation and coordination of communication evaluation effort in the participating regions.



LOCATION(S) OF WORK:
1. Labrador
2. Nunavik
3. Nunavut
4. Inuvialuit Settlement Region
5. Yukon

SCHEDULE:
For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Chris Furgal
Public Health Research Unit
Laval University Medical Centre
Centre Hospitalier Universitaire de Québec
CHUQ-CHUL
2400 d'Estimauville
Beauport, Québec

Phone: (418) 650-5115 (ext. 5260)
Fax: (418) 654-3132
E-mail: Christopher.Furgal@crchul.ulaval.ca

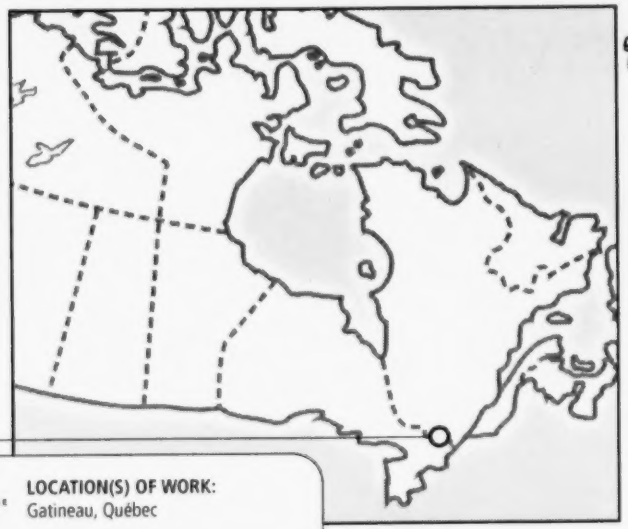
TIME FRAME:
Co-ordinate and provide technical survey assistance to each of the Inuit initiatives 2003/2004.

Co-ordination and Administration of the Northern Contaminants Program (NCP)

How is the Northern Contaminants Program administered?

RELEVANCE:
Since 1991/1992, Indian and Northern Affairs Canada (INAC) has provided the **Northern Contaminants Program (NCP)** with financial administration and management services to support more than 400 scientific and other northern-related projects. These administration and management services enable the central co-ordination of the program among four federal departments, departments from three territorial governments, four Aboriginal organizations, and approximately 12 universities and research institutes. INAC maintains the chair and secretarial support of project review teams. This management structure ensures that the program remains scientifically defensible, while at the same time, achieves real progress in terms of its broad policy objectives.

PROJECT SUMMARY:
INAC headquarters will continue to offer financial and secretariat support to, and overall co-ordination of, the NCP. This will include at least two Management Committee meetings and various ad hoc meetings and workshops. INAC will also co-ordinate and implement various communications activities with the Aboriginal organizations and the territorial **contaminants** committees. Some highlights of activities this year include: maintenance and updating of the NCP website; development of a database of current and past NCP projects; implementing the online proposal submission and management system; production of fact sheets for the **Canadian Arctic Contaminants Assessment Report II (CACAR II)** report; and facilitate production of CACAR II results in scientific journals.



LOCATION(S) OF WORK:
Gatineau, Québec

SCHEDULE:
For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Russel Shearer
Northern Science and Contaminants Research
Department of Indian Affairs and Northern Development (DIAND)
10 Wellington Street, Room 660
Gatineau, Québec
K1A 0H4

Phone: (819) 994-7484
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E-mail: ShearerR@inac.gc.ca

TIME FRAME:
Ongoing to March 2004.

Work on the Northern Contaminants Program Publications Database

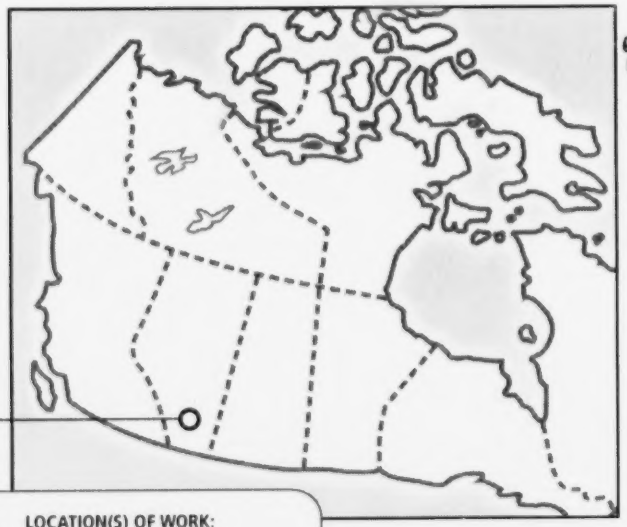
How can NCP publications be made more accessible?

RELEVANCE:

The **Northern Contaminants Program (NCP)** Publications Database first began development in 2002/2003. The main focus of the project is to provide a broadly accessible central registry of all NCP publications. NCP publications are defined as publications that have resulted from research, education or communication activities that were wholly or partially funded by the NCP. With the cooperation of NCP researchers and secretariat, approximately 1050 publications were identified as of March 2003.

PROJECT SUMMARY:

The project's focus this year will be to determine which publications are not readily available to the University of Calgary and obtain copies of them. All the publications will be filed and duplicates will be removed. At the end of the year the filing system will allow the project to determine an updated count of the number of known NCP publications. The project is also creating bibliographic records for the publications, and each will be cited, abstracted, and indexed. The final task will be to complete the NCP Publications Database website. This will include enhancing the drop-down lists, completing the documentation pages, developing new graphic designs for the website, and translating the English text into French.



LOCATION(S) OF WORK:
Calgary, Alberta

SCHEDULE:
For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Ross Goodwin
Manager, Arctic Science and Technology Information System (ASTIS)
Arctic Institute of North America
University of Calgary
Calgary, Alberta
T2N 1N4

Phone: (403) 220-4036
Fax: (403) 282-4609
E-mail: rgoodwin@ucalgary.ca

TIME FRAME:
A final report, new records in the NCP Publications Database, and the NCP Publications Database website will be completed by March 2004.

New Contaminants in Arctic Biota

What are the levels of new contaminants in Arctic animals?

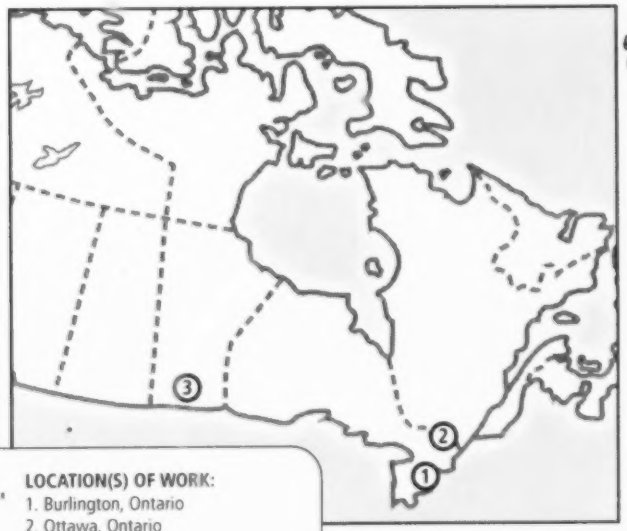
RELEVANCE:

Recent studies have demonstrated the presence of new **contaminants** in the Arctic environment. These chemical contaminants have been mentioned in the recent **Canadian Arctic Contaminants Assessment Report II (CACAR II)** and the **Arctic Monitoring and Assessment Programme (AMAP)** report on **persistent organic pollutants (POPs)**. Most of these chemicals, such as the **brominated** flame retardants (BFRs), perflurooctane sulfonic acid (PFOS), and chlorinated paraffins (CPs), are known to be widely used in everyday consumer and industrial products. Others, such as the **polychlorinated naphthalenes (PCNs)**, are combustion byproducts. There has been some measurement of levels in the Arctic but there are still numerous knowledge gaps identified in CACAR II that need to be filled. The information required includes **temporal trends**, levels in different species, and information on geographic variations of the new contaminants. This project aims to fill in these information gaps.

PROJECT SUMMARY:

This project is looking to determine the geographic and temporal trends of emerging chemical contaminants and **toxic** metals in Arctic marine **biota**. The results will help the **Northern Contaminants Program (NCP)** identify and prioritize new contaminants entering the Arctic marine and freshwater environments. The information resulting from this project will contribute to Canadian and international assessments of new candidate POPs for addition to the **Stockholm Convention**. The project will select samples of seals, belugas and seabirds that have already been collected from several Arctic locations over several different years. Analysis of these samples will allow the project team to determine if levels are rising and if they differ from region to region.

HG



LOCATION(S) OF WORK:
1. Burlington, Ontario
2. Ottawa, Ontario
3. Winnipeg, Manitoba

SCHEDULE:
This project will take place over two years. For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Derek Muir
National Water Research Institute
Environment Canada
867 Lakeshore Road
P.O. Box 5050
Burlington, Ontario
L7R 4A6

Phone: (905) 319-6921
Fax: (905) 336-6430
E-mail: derek.muir@ec.gc.ca

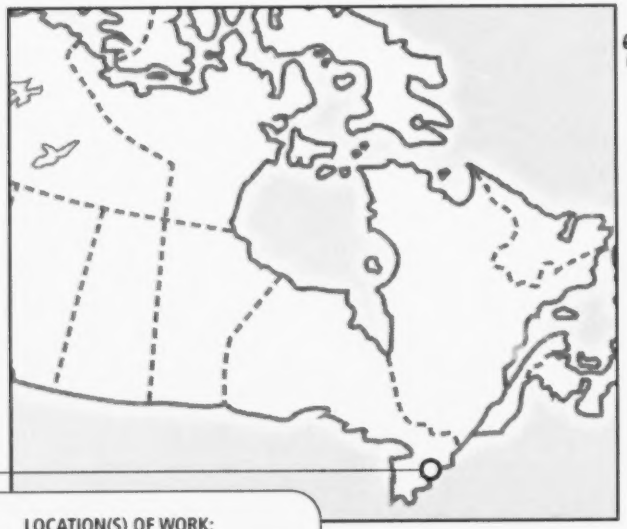
TIME FRAME:
Existing samples will be distributed to participating laboratories in early August 2003. Newly collected samples will be collected and sent to the labs in mid-September 2003. Preliminary results will be available in early January 2004. Final report will be prepared by March 2004.

Digital Arctic for Environmental Studies (DAFES)

How do you bring together information regarding contaminants in the Arctic?

RELEVANCE:
Environmental **contaminants** are a global problem; however the Arctic environment is unique in that the sources of contaminants originate largely outside of the Arctic region and are global in nature. Current concern about Arctic contaminants began with the discovery of **persistent organic pollutants (POPs)** in the environment. Subsequent research confirmed that Arctic animals have elevated levels, posing a threat not only to the people who eat them, but also to the animals themselves, and their **ecosystems**. There is a need to effectively organize and communicate the large amount of information on issues related to contaminants in the North to Aboriginal peoples and other northerners. The information should be provided in a format that is helpful for making informed decisions about harvesting and consuming traditional/country food at various geographic locations. The project will also be useful to Arctic researchers, the modelling community, policy makers, and public interest groups.

PROJECT SUMMARY:
This project will gather information regarding Arctic Canada from numerous sources and integrate it into a Geographic Information System (GIS). It will include data from the **Northern Contaminants Program (NCP)** and the **Arctic Monitoring and Assessment Programme (AMAP)**, and will include information regarding inhabitant population, vegetation, land use, ice cover, temperature, and contaminant levels in the Arctic. The finished database will give the user the ability to bring up information related to a chosen location in the Arctic region.



LOCATION(S) OF WORK:
Downsview, Ontario

SCHEDULE:
For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: Yi-Fan Li
Meteorological Service of Canada
Environment Canada
4905 Dufferin St.
Downsview, Ontario
M3H 5T4

Phone: (416) 739-4892
Fax: (416) 739-4288
E-mail: yi-fan.li@ec.gc.ca

TIME FRAME:
October 2003 – Gridded datasets for population, land/water/ice cover, precipitation, and others

January 2004 – Gridded datasets for concentrations of pollutants in **biotic** compartments related to the **food chain**

March 2004 – Paper/report submission.

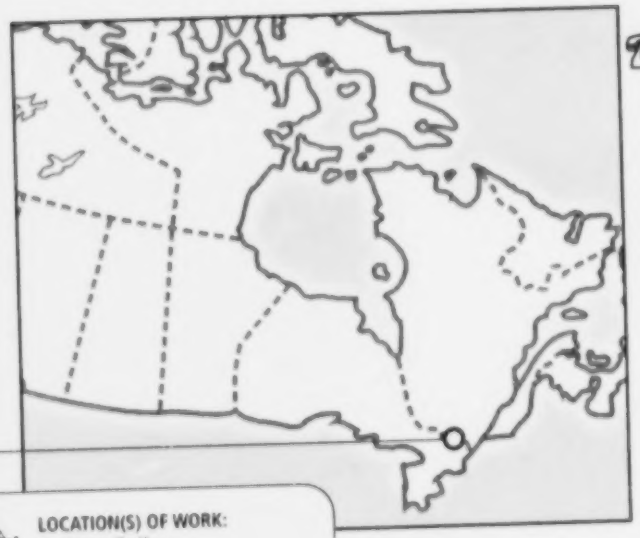
Facilitation of International Action Related to the Long-range Transport of Contaminants into the Arctic

? *What international action is Canada taking to control the transport of contaminants through air and water to the Arctic from outside sources?*

RELEVANCE:
International action is required to stop the transport of **contaminants** to the Canadian Arctic and to reduce the accumulation of contaminants in northern **food chains**. This can only be achieved by identifying where the contaminants are coming from and by reducing or eliminating their use at these sources through international agreements that would limit the production and use of these contaminants.

PROJECT SUMMARY:
The **Northern Contaminants Program (NCP)** has demonstrated the significance of long-range transboundary air pollution to the Arctic. The activities covered under this project have focussed upon: a) facilitating international co-operation to identify the significance of long-range contaminant sources and their transport pathways through such programs as the **Arctic Monitoring and Assessment Programme (AMAP)**; and b) assisting implementation and development of appropriate international controls on emissions and discharges. Reduction and elimination of contaminant input to the Arctic from distant sources outside of Canada requires comprehensive international co-operation, which includes the following:

1. Facilitating implementation of the 1998 Aarhus **persistent organic pollutants (POPs)** and **Heavy Metals** Protocols under the convention on Long-range Transboundary Air Pollution (LRTAP).
2. Facilitating implementation of the 2001 **Stockholm Convention** on POPs and associated global actions on POPs.



LOCATION(S) OF WORK:
Gatineau, Québec

SCHEDULE:
For more information on the project, please contact the project leader directly.

CONTACT INFORMATION:
Project Leader: David Stone
Director
Northern Science and Contaminants Research
Indian and Northern Affairs Canada (INAC)
10 Wellington Street
Gatineau, Québec
K1A 0H4

Phone: (819) 997-0045
Fax: (819) 953-9066
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TIME FRAME:
April 2003 – March 2004.

Appendices

Appendices

Glossary

AMAP
The Arctic Monitoring and Assessment Programme (AMAP) is an international organization established in 1991 to implement components of the Arctic Environmental Protection Strategy (AEPS). Now a programme group of the Arctic Council, AMAP's current objective is "providing reliable and sufficient information on the status of, and threats to, the Arctic environment, and providing scientific advice on actions to be taken in order to support Arctic governments in their efforts to take remedial and preventive actions relating to contaminants".

ABIOTIC
An abiotic environment refers to the non-living natural environment made up of non-living, **inorganic**, objects such as rocks and minerals.

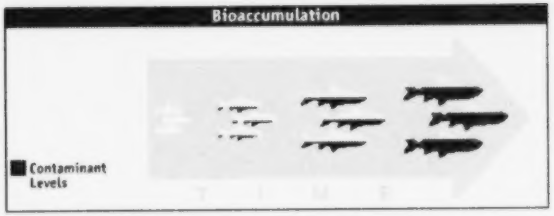
ANTHROPOGENIC
Originating from human activity.

ARCHIVED
Archived samples are samples (e.g. animal tissues or organs) that are stored, usually in freezers, for future analysis.

ARSENIC
Arsenic is a steel grey, brittle metallic element that is found naturally in rocks and soil. Some of its compound are poisonous and are used as agricultural **insecticides** and **poisons**. Arsenic can bioaccumulate in plants and animals.

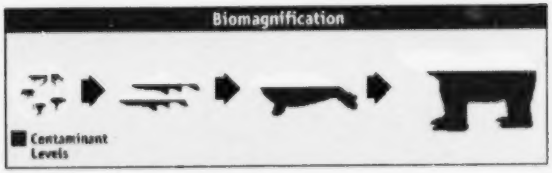
BENTHIC
The benthic layer is the sediment and mud found at the bottom of lakes, rivers and oceans. Benthic organisms live on the bottom or in these sediments. Pelagic organisms live in the water column.

BIOACCUMULATE (BIOACCUMULATION)
Bioaccumulation is the build-up or storage of substances (such as contaminants) in the bodies of animals over time. Bioaccumulation of **contaminants** can occur by eating animals or drinking water that contain these contaminants. Contaminants that bioaccumulate are very slow to change or do not change to a chemical form that can be digested and eliminated by the animal.



BIOAVAILABILITY
A chemical is bioavailable when it is in a form that can be taken up or absorbed by plants and animals.

BIOMAGNIFY (BIOMAGNIFICATION)
When an animal eats a plant or another animal, it consumes all the contaminants stored in that food. Contaminants can biomagnify in animals that use other animals for food because the concentration increases with each step from prey to predator.



BIOMARKER
A biomarker is a certain biological element that undergoes change when exposed to a stressor, such as chemical contamination. Biological chemicals such as **enzymes** are common biomarkers used to detect exposure to contamination as well as subtle (non-serious) biological effects caused by contamination.

BIOMONITORING
Biomonitoring is a method of testing and monitoring different **contaminants** in the environment through living organisms. For example, polar bear tissue may be analyzed as a way of biomonitoring **POPs** in the Arctic marine environment.

BIOTA
The animal and plant life (i.e. living things) of a region.

BIOTIC
A biotic environment refers to living organisms in the environment.

BROMINE (BROMINATED)
Bromine is a naturally occurring element. It is a dense, deep reddish brown liquid that is easily vaporized into a brownish-red **vapour**. It occurs mainly as the bromide ion, Br-, in salts in seawater and in many saline springs. Metal bromides occur in small amounts in seawater and salt deposits as well as in water from mineral springs. One of the most common uses of bromine is for the manufacture of bromine compounds used in gasoline. Bromine compounds are also widely used in **pesticides** and for treating plastic material and textiles to make them fireproof

CADMIUM
Cadmium is a **heavy metal** found naturally in soils and rocks. It is soft and has a silvery colour. It is mined and used in some industries to make things such as batteries, some **pesticides**, and some types of paint.

CANADIAN ARCTIC CONTAMINANTS ASSESSMENT REPORT II (CACAR II)
This report, also referred to as CACAR II, is a comprehensive assessment of **contaminants** in the Arctic. CACAR II contains detailed results of all the research that was conducted over the past five years under the second phase of the **Northern Contaminants Program**.

CANCER
Cancer is a disease that results in uncontrolled, abnormal growth of the body's cells resulting in tumours (large masses of cells).

CHLORDANE
Chlordane is a colourless, odourless **POP** used as an **insecticide**. It can affect the nervous system of humans and wildlife. Chronic exposure to humans can cause liver damage and possibly cancer. It is currently restricted in use for such things as termite control and non-food plants.

CHLORINE (CHLORINATED)
Chlorine is a naturally occurring, poisonous greenish-yellow gaseous non-metallic element used for purifying water, bleaching and in the manufacturing of many **organic** chemicals. It occurs naturally only as a salt, as in sea water.

CONGENER
The individually distinct chemicals that belong to a family of chemicals with similar basic structure, such as **PCBs** and **dioxins**, are know as congeners. PCBs are a mixture of different PCB congeners.

CONTAMINANTS
A contaminant is a substance that is found in a place where it should not be. This does not necessarily mean that it is harmful, but depending on what it is and the amount that is present, it may be. The types of contaminants that are found in the Canadian north include:

- **Persistent Organic Pollutants (POPs)**, a group of mostly human-made chemicals which includes the substance called **organochlorines (OCs)** and can stay in the environment for many years without changing. They can be transported long distances in the atmosphere.
- **Heavy metals** such as **mercury**, **cadmium**, and **lead**; and
- **Radionuclides** such as **cesium**, **strontium**, and **polonium**.

COPPER
Copper is a reddish metal found naturally in some soils and rocks. It is a very good conductor of heat and electricity, and is often used to make electrical wires.

DDE
DDE is a **POP** found in the environment as a result of the breakdown of **DDT**, an **insecticide**.

DDT
DDT is a **POP** developed in the 1940s to kill lice and to kill biting insects that carry diseases such as malaria, yellow fever, and typhus. DDT was heavily used to kill insects feeding on crops in the 1950s and 1960s in the Great Lakes region until it was found to be harmful to other forms of life. DDT is banned in Canada.

DEOXYRIBONUCLEIC ACID (DNA)
DNA contains all the genetic information of a species. This information can be used to reproduce other organisms of the same species and is passed on from generation to generation through the offspring.

DEMETHYLATION
Demethylation is the **enzymic** removal of a methyl group. Methyl groups are the most basic molecular structures in **organic** chemistry.

DIOXINS/FURANS
Dioxins and furans are highly **toxic** chemical substances. Dioxins and furans are known to cause serious health problems, including **cancer**, in laboratory animals. The biggest source of dioxins and furans in Canada is the large-scale burning of municipal and medical waste.

DISEASE RESISTANCE
Disease resistance refers to the ability of animals and plants to withstand the attack from a disease.

ECOSYSTEM
An ecosystem is a system that is formed by the interactions of organisms with their non-living environment. The organisms and the environment work together as a unit, called an ecological unit.

ENDOCRINE-DISRUPTING EFFECTS

The endocrine system primarily controls metabolic activities through hormones. Endocrine glands secrete hormones into the blood, which carries these chemical messages to the target cells. Endocrine disrupting chemicals interfere with this process by mimicking hormones and /or blocking the target sites.

ENDOSULFAN

Endosulfan is a **POP** generally used as an **insecticide** in the control of crop insects and mites.

ENZYME (ENZYMIC)

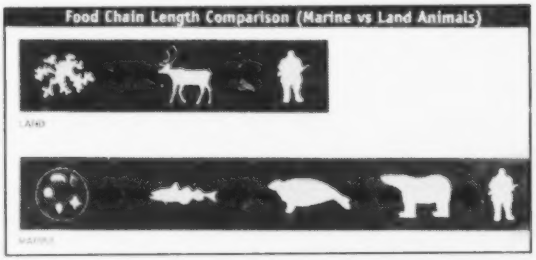
A biological compound that helps the body to process chemicals. Some enzymes are responsible for digesting protein in food. Other enzymes found in the liver are responsible for getting rid of contaminants.

FALLOUT

Fallout describes how particles that are held in the air descend to the ground and accumulate on surfaces. Fallout is generally associated with particles that have been sent into the atmosphere following a nuclear explosion or a volcanic eruption and slowly descend, falling onto ground or water surfaces.

FOOD CHAIN

Plants and animals can be linked together in feeding relationships called food chains. At the bottom of food chains are green plants that convert sunlight into food energy for the rest of the chain. Animals that eat the plants are then eaten by another animal, and so on up the chain. The number of animals involved can vary. For example, in the North, the lichen —>caribou—> human food chain has fewer feeding links, and is much shorter than the algae (a small plant that lives in water but needs sunlight)—> fish—>seal—>polar bear—>human food chain. In nature, food chains overlap to form food webs.



FOOD CONSUMPTION ADVISORIES

Food consumption advisories are sometimes issued by the Territorial health department in consultation with Health Canada when they determine that the level of **contaminants** in a traditional/country food may risk the health of those who eat this food. Such an advisory may recommend, for example, that people should only eat a certain number of livers from a particular fish species in a year.

FOOD WEB

A food web is the interaction of food chains. **Food chains**, which involve a direction from lower to higher ordered organisms, interact with one another in nature and form webs. These webs are more complex then chains as different organisms cross over into other chains and complicate the flow of energy from one species to another. (See food chain)

HEAVY METALS

Heavy metals are naturally-occurring metals found in rocks and soils. They are also released to the environment by human activities. They generally do not decay into other elements and therefore persist in the environment. Examples of heavy metals are mercury and cadmium.

HEXACHLOROCYCLOHEXANE (HCH)

hexachlorocyclohexane (HCH) is an **POP** used to kill insects, an **insecticide**. It does not break down easily in the environment, and can be transported great distances in the atmosphere.

IMMUNE SYSTEM

The immune system is made up of cells and tissues responsible for recognizing and attacking foreign microbes and substances in the body.

IMMUNOLOGICAL

Related to the study of the **immune system**

IMMUNOTOXIC

Something, eg. bacteria or chemical, that causes damage to the **immune system** is immunotoxic.

INORGANIC

Inorganic material is inanimate (e.g. non-living) in nature and makes up the **abiotic** environment.

IN UTERO

in utero is a Latin based term that means within the womb

IN VIVO

in vivo is a Latin based term that means in life. It is usually used to describe bodily functions or reactions within a living organism.

ISOTOPE

Isotopes are species of atoms of the same element with nearly identical chemical behaviour but with different mass and physical properties. For example, different isotopes of carbon and nitrogen ca be found in nature.

ISOMER

Isomers are different forms of the same chemical compound, being made up of the same number and composition of atoms, but in different arrangements. Each isomer can have a slightly different properties.

LEAD

Lead is a soft, blue-grey, easily-worked **heavy metal** that is naturally present in rocks and soils. It is used to make some kinds of glass, shot for shotguns, and combined with other metals for use in a variety of metallic items. Lead may be released to the environment by human activities, including the use of leaded-gasoline (in North America, lead was added to gasoline until the 1980s). Lead can be **toxic** to living things. In animals and people, lead **accumulates** in the brain and bones.

LIPOPHILIC

Attracted to fatty tissues.

LONG-RANGE TRANSPORT

Long-range transport refers to the movement of **contaminants** through the atmosphere or the ocean from distant sources. Many contaminants that are detected in the Arctic have been used in places rather far away but travel through the air and ocean currents eventually reaching the Arctic where they are deposited.

MERCURY

HG Mercury is a **heavy metal** that is naturally found in rocks and soil in combination with other chemicals. It is the only metal that is liquid at room temperature. It is silvery in colour and flows easily so it is sometimes used in thermometers. There are many human-made sources of mercury that are released to the atmosphere. Also, mercury may be released when soils are flooded in the creation of reservoirs for making electricity (hydroelectric dams). Mercury is **toxic** to most living things. It **accumulates** in the liver, kidneys, hair, and skin of animals and people.

METHYLMERCURY

Mercury, like other metals, can be found in different chemical forms in the environment. Methylmercury is the mainly **organic** form of mercury that is the most **toxic** and likely to cause effects. Methylmercury can also **bioaccumulate** and **biomagnify** in **food webs**.

METABOLISM

The sum of physical and chemical processes occurring within a living cell or organism that are necessary for the maintenance of life. Under these processes, substances are broken down to provide energy for certain vital processes while other substances, necessary for life, are created.

METABOLITE

A substance essential to the **metabolism** of a particular organism or to a particular metabolic process.

NEUROBEHAVIOURAL

Neurobehavioural refers to the way the brain affects emotion, behaviour, and learning via the nervous system.

NEURODEVELOPMENT

Neurodevelopment is the development of the nervous system.

NEUROMOTOR

Neuromotor is the nerve fibre or impulse going away from the central nervous system towards an effector (the ending of a nerve).

NEUROTOXIC

Neurotoxic effects are caused by substances that are considered to be **toxic** to living organisms. These substances can cause irreversible damage to the central nervous system.

NORTHERN CONTAMINANTS PROGRAM (NCP)

The Northern Contaminants Program (NCP) has been developed through consultation with the scientific community, northern Aboriginal organizations, other governmental departments, and northern communities. Its goal is to reduce and wherever possible eliminate **contaminants** in traditional/country food. This goal is supported by involving Northerners in the program, and by providing them with the tools and information for making their own informed decisions on food consumption.

NUNAVIMMIUT

Nunavimmiut are Inuit residents of Nunavik.

NUNAVUMMIUT

Nunavummiut are Inuit residents of Nunavut.

OOCYTES

A cell that gives rise by meiosis (cell division from a single diploid cell to four haploid cells) to an ovum (female egg cell).

ORGANIC

Organic material is derived from living organisms and is made up of carbon-based compounds.

ORGANOBROMINE
Organobromines are bromine-containing chemicals made by humans. Several organobromines are used as flame retardants in plastics.

ORGANOCHLORINES (OC)
Organochlorines (OCs) are **chlorine**-containing chemicals made by humans. Organochlorines dissolve in fats and oils, and therefore are stored in the fat and blubber of animals (i.e. bioaccumulate) and are passed on through the **food chain** (i.e. **biomagnify**). Examples of OCs include: **toxaphene**, and **chlordane**. Organochlorines can be **toxic** or poisonous to living things.

OXIDATIVE STRESS
Oxidative stress is a condition where increased oxidant production in organisms characterized by the release of very unstable and highly reactive molecules results in cellular degeneration.

PBDES/BDPES
Polybrominated diphenyl ethers and brominated diphenyl ethers are a group of human-made **organobromine** chemicals that are used as flame retardants in various plastic materials, such as polystyrene. (See also **PBBs**).

PCBS
Polychlorinated biphenyls (PCBs) are a group of human made, industrial **POP** chemicals. There are many different kinds of PCBs. Because they do not conduct electricity, PCBs were used in electrical transformers as insulators since the 1930s. PCBs do not break down easily in the environment and there is concern that they may be harmful to living things. Some kinds of PCBs are thought to cause **cancer** and may contribute to other subtle effects in unborn children. The use of PCBs was banned in many countries, including Canada, in the 1970s.

PATHOLOGY
The study of the essential nature of diseases and especially of the structural and functional changes produced by them.

PERFLUORINATED ACIDS (PFAS)
Perfluorinated acids (PFAs) have no known route of degradation or metabolism under normal environmental conditions, meaning that they are extremely **persistent** in the environment. Examples of PFAs are **perfluorooctane sulfonate (PFOS)** and **perfluorooctanoic acid (PFOA)**.

PERFLUOROOCTANE SULFONATE (PFOS)
Perfluorooctane sulfonate is an example of a **perfluorinated acid (PFA)** that has recently been identified in liver and blood of polar bears and seals in the Arctic, including some samples from Nunavut. There is a lot of concern about the presence of this chemical in the environment as **PFAs** are highly **persistent** and not known to degrade. It can cause **cancer**, lead to enlarged livers as well as affect the fertility of wildlife.

PERFLUOROOCTANOIC ACID (PFOA)
Perfluorooctanoic acid (PFOA), similar to **(PFOS)** is a **perfluorinated acid (PFAs)** that has recently been identified in liver and blood of polar bears and seals in the Arctic, including some samples from Nunavut. There is a lot of concern about the presence of this chemical in the environment as **PFAs** are highly **persistent** and not known to degrade. It can cause **cancer**, lead to enlarged livers as well as affect the fertility of wildlife.

PERSISTENT
Persistent, when referring to chemicals, is the resistance of a chemical to break down. A persistent chemical, once introduced, stays in the environment for an indefinite length of time.

PERSISTENT ORGANIC POLLUTANTS (POPS)

Persistent organic pollutants (POPs) are a group of human-made chemicals used as **pesticides** and industrial chemicals, which includes the substances called **organochlorines (OCs)**. POPs can be transported long distances in the atmosphere and can stay in the environment for many years without changing.

PESTICIDES

Pesticides are poisons used to kill pests (plants or animals that are a nuisance or harmful). There are two main types: insecticides used to kill insects, and herbicides used to kill weeds, mold, and fungus. **Chlordane**, **toxaphene**, **HCH**, and **DDT** are examples of pesticides.

POLYBROMINATED BIPHENYLS (PBBS)

Polybrominated biphenyls are a group of human-made **organobromine** chemicals that are used as flame retardants in various plastic materials, such as polystyrene. (See also **BDPEs**)

POLYCHLORINATED *N*-ALKANES (PCAS)

Polychlorinated n-alkanes are a group of **toxic** chemicals belonging to the polychlorinated aromatic compounds **(PCAs)**. Their most common applications include use as high temperature lubricants in metal-working machinery.

POLYCHLORINATED NAPHTHALENES (PCNS)

These chemicals are a group of 75 compounds which have been used as lubricants, fungicides, insecticides, and as insulators which pre-date **PCBs**. They are similar in structure to **PCBs**, and are **toxic.**

POLYPEPTIDE

A chain of amino acids linked by a chemical bond formed between neighbouring amino acids. Many polypeptide chains combined to form a protein.

QUALITY ASSURANCE/QUALITY CONTROL

Because research is conducted by many different people in many regions across the country, it is often difficult to ensure that the same standards in producing data are in use. Quality assurance/quality control is a system of procedures and corrective actions that attempt to ensure that the different research studies, environmental monitoring and sampling, and other technical and laboratory activities are comparable with another and the data reported are of the highest quality possible.

RADIONUCLIDES

Radionuclides are atoms that emit radiation and, like **heavy metals**, are naturally present in rocks and soils. They may also be human-made. Certain kinds of radionuclides have been released to the environment through atmospheric testing of nuclear weapons, nuclear waste dumping and uranium mining. Radionuclides tend to accumulate in the bones and muscles of animals and people. Natural radionuclides in the Canadian North include **polonium** and **lead**.

RISK ASSESSMENT

The qualitative and quantitative study of the risk posed to human health and the environment by the presence and/or use of specific pollutants.

SELENIUM

Selenium is a nonmetallic element that resembles sulfur. It can be naturally found in rock and soils from some areas and it has been suggested that at the right concentration, it can counteract the effects of **mercury**, but this is unproven as of yet.

SERUM
The fluid part of blood called is plasma. Serum is this fluid minus the fibrogen (blood clotting property).

STOCKHOLM CONVENTION
The Stockholm Convention is a global treaty to protect human health and the environment from **persistent organic pollutants (POPs)**.

STRONTIUM
Strontium is a naturally occurring radioactive element that is used to date rock and sediments.

TEMPORAL TRENDS
Changes over time.

TOXAPHENE
Toxaphene is a **POP** chemical that was used as a **pesticide** from the 1950s to 1970s. It is very poisonous to living things, especially fish. Toxaphene has never been licensed for use in Canada, and it was banned in the United States in 1982.

TOXIC (TOXICITY)
Toxic (toxicity) refers to the capability of a substance to cause harm or be poisonous to humans, animals, or other living things. In common usage, the term toxic substances refers to chemical substances that are capable of causing harm at very low levels of exposure.

TOXICOLOGY
Toxicology refers to the scientific study of the effects, chemistry, and treatment of poisonous (toxic) substances.

TROPHIC LEVELS
Levels in a food web characterized by organisms which are the same number of steps removed from the primary producers of **ecosystems** (e.g., generally aquatic and terrestrial green plants comprise the first tropic level, and plant-eating organisms comprise the second.)

VAPOUR
A substance in the gaseous state, as distinguished from a liquid or solid state.

ZINC
Zinc is a brittle metal at ordinary temperatures, and is not found abundantly in nature. It is used in the preparation of certain metal alloys, like bronze and brass. An excess of zinc can be **toxic**.

ZOOPLANKTON
The passively floating or weakly swimming usually microscopic animal life in a body of water.

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The following list can be used to search for a project by affiliation or project leader.

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Key Subject Areas and Contaminants

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For More Information

If you wish to obtain more information on any of the projects within this booklet or have any questions regarding contaminants in general, please feel free to contact any of the persons listed below, they will be glad to assist you.

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French and Inuktitut versions available.